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ANNUAL REPORT

OF THE

Department of Agriculture

OF THE

PROVINCE OF ONTARIO

1909

VOL. I.

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1911

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TORONTO.

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CONTENTS

VOLUME I.

Report of the Agricultural College and Experimental Farm.

Report of the Agricultural and Experimental Union.

Reports of the Dairymen's Associations and Dairy Schools.

Report of the Live Stock and Poultry Associations.

Report of the Poultry Institute.

Report of the Corn Growers' Association.

Report of the Bee Keepers' Association

Report of the Bureau of Industries (Agricultural Statistics)

VOLUME II.

Report of the Fruit Growers' Association.

Report of the Fruit Branch.

Report of the Vegetable Growers' Association.

Report of the Entomological Society.

Report of the Agricultural Societies.

Report of the Field Crop Competitions.

Report of the Horticultural Societies.

Report of the Veterinary College.

Reports of the Farmers' Institutes. (Parts I. and II.)

Reports of the Women's Institutes. (Parts I. and II.)

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THIRTY-FIFTH ANNUAL REPORT

OF THE

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Ontario Agricultural College

AND

Experimental Farm

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
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WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present for the consideration of Your Honour, the Report of the Ontario Agricultural College and Experimental Farm for 1909.

Respectfully submitted,

JAMES S. DUFF,
Minister of Agriculture.

TORONTO, 1910.

THE ONTARIO AGRICULTURAL COLLEGE, GUELPH

Hon. James S. Duff, *Minister of Agriculture, Toronto.*

FACULTY OF INSTRUCTION, 1909-1910.

(All except the President arranged in order of Seniority.)

G. C. Creelman, B.S.A., M.S.	President.
H. H. Dean, B.S.A.	Professor of Dairy Husbandry.
C. A. Zavitz, B.S.A.	Professor of Field Husbandry.
J. Hugo Reed, V.S.	Professor of Veterinary Science.
H. L. Hutt, B.S.A.	Professor of Landscape Gardening.
G. E. Day, B.S.A.	Professor of Animal Husbandry.
J. B. Reynolds, B.A.	Professor of English.
R. Harcourt, B.S.A.	Professor of Chemistry.
Miss Mary Urie Watson	Director of Home Economics.
John Evans	Professor of Manual Training.
S. B. McCready, B.A.	Professor of Botany and Nature Study.
S. F. Edwards, M.S.	Professor of Bacteriology.
C. J. S. Bethune, M.A., D.C.L.	Professor of Entomology and Zoology.
W. R. Graham, B.S.A.	Professor of Poultry Husbandry.
W. P. Gamble, B.S.A.	Professor of Soil Chemistry and Lecturer in Geology.
W. H. Day, B.A.	Professor of Physics.
E. J. Zavitz, B.A., M.S.F.	Professor of Forestry.
J. W. Crow, B.S.A.	Professor of Pomology.
R. W. Wade, B.S.A.	Associate Professor of Animal Husbandry.
T. D. Jarvis, B.S.A.	Associate Professor of Entomology and Zoology.
J. Buchanan, B.S.A.	Associate Professor of Field Husbandry.
Miss Annie Ross, M.D.	Lecturer in Physiology, Home Nursing, Psychology, and Child Study.
H. H. LeDrew, B.S.A.	Lecturer in Economics.
D. H. Jones, B.S.A.	Lecturer in Bacteriology.
J. W. Eastham, B.S.	Lecturer in Botany.
J. E. Howitt, M.S.A.	Lecturer in Botany and Entomology.
Wm. Hunt	Lecturer in Floriculture.
Morley Pettit	Lecturer in Apiculture.
Miss Grace Greenwood	Instructor in Normal Methods.
E. W. Kendall	Demonstrator in Manual Training.
H. L. Fulmer, B.S.A.	Demonstrator in Chemistry.
Miss Rosemina Greist	Instructor in Domestic Art.
R. W. Stratton	Demonstrator on Cream Separators and in Buttermaking.
G. R. Taylor	Demonstrator in Milk Testing.
Miss Evelyn Allan	Demonstrator in Laundry and Household Administration.
Miss. E. C. Dwight, B.A.	Instructor in French and German and Acting Librarian.
Miss M. A. Purdy	Demonstrator in Chemistry.
L. Caesar, B.A., B.S.A.	Lecturer in Fungous Diseases and Insects.
G. H. Unwin, B.S.A.	Resident Master and Instructor in English.
Miss Jean Roddick	Instructor in Domestic Science.
Mrs. F. Doughty	Demonstrator in Domestic Art.
R. R. Graham, B.A.	Demonstrator in Physics.
A. E. Slater, B.S.A.	Demonstrator in Soil Chemistry.
Miss Mary McLennan	Demonstrator in Domestic Science.
A. H. McLennan, B.S.A.	Demonstrator in Poultry Husbandry.
Alex. McKay	Demonstrator in Cheesemaking.
L. D. Jackson, B.A.	Fellow in Chemistry.
Capt. Walter Clark	Drill Instructor.
(To be Appointed)	Instructor in Athletics.

COLLEGE OFFICERS.

S. Springer	Bursar.
J. B. Fairbairn	Secretary and Registrar.
W. O. Stewart, M.D.	Physician.
Mrs. K. Fuller	Superintendent Macdonald Hall.
Mrs. M. Cunningham	Matron Agricultural College.

ONTARIO AGRICULTURAL COLLEGE

AND EXPERIMENTAL FARM.

1909.

To the Honorable the Minister of Agriculture:

Sir,—I have the honor to submit herewith the thirty-fifth annual report of the Ontario Agricultural College and Experimental Farm, including the report of the Macdonald Institute, for the year 1909.

The following is a brief review of the work contained in this report:—

PAGE.

Part I. Report of the President 7
Changes in the Staff, 7; Home Economics, 8; College work, 8; Short Courses, 9; Students, 9; Graduates, 10; Associates, 11; Scholarships, 12; Prizes and Medals, 12; Certificates and Diplomas at Macdonald Institute, 13; Stock Judging, 14; Agricultural Specialists in County Towns, 16.

Financal Statement 17

Part II. The Professor of English 22

Part III. Report of the Professor of Entomology and Zoology 24
Outside Lectures, 26; Publications, 26; Fairs, Meetings, etc., 27; Correspondence, 27; Experiments, 29; Museum, 36; Apparatus, 36.

Part IV. Report of the Professor of Botany 37
Recent Weeds, 38; Weed Seeds, 40; Plant Diseases, 40; Black Rot Canker, 41; Experimental work, 42; Spraying experiments, 42; Bindweed experiments, 43; Tar Paper experiment, 43; Alfalfa and Clover Seed, 44; Alsike Seed, 47; Timothy Seed, 47; Outside lectures, 48; Publications, 48; Herbarium, 48.

Part V. Report of the Professor of Physics 49
Instruction, 49; Weather, 49; Lightning, 54; Drainage, 55; Traction Ditcher, 59; Changes in the department, 59.

Part VI. Report of the Professor of Chemistry 60
Instruction, 60; Laboratory work, 61; Cattle Feeds, 61; Human Foods, 66; Wheat, 67; Bread, 67; Flour, 68; Flour Testing, 70; Testing Wheat, 70; Ageing Wheat and Flour, 74; Blending of Hard and Soft Wheats, 76; Chemicals in fumigating mills, 76; Insecticides and Fungicides, 76; Lime-Sulphur Washes, 77; Paris Green, 80; White Arsenic and Sodium Arsenate, 80; Lead Arsenate, 80; Bordeaux Paste, 81; Cheese from normal and over-ripe Milk, 81.

Part VII. Report of the Professor of Soil Chemistry and Lecturer in Geology.. 84
Soil Investigation, 84; Fertilizers, 85; Water for domestic purposes, 88; Wood Ashes, 92; Road materials, 92; Relation of Geology to Agriculture, 93.

Part VIII. Report of the Professor of Veterinary Science 94

Part IX. Report of the Professor of Dairy Husbandry 96
Teaching, 96; Creamery, 96; Experimental work, 97; Diplomas, 98; Cow Testing, 99; Milk and Cream Tested, 100; Pasteurization, 101; Hand Printing of Butter *vs.* Machine Printing, 106; Casein and Fat in Milk, 107; Effect of acid at dipping of Curds, 116; Moisture in Curd and Cheese, 119; Milk solids lost in making over-ripe milk into Cheese, 121; Fine *vs.* Coarse Wire Curd Knives, 122; Whey and Whey Butter, 123.

Part X. Report of the Professor of Bacteriology 125
Laboratory analyses, 125; Plant Diseases, 128; Tuberculosis, 130; Legume Bacteria, 131.

PART XI. REPORT OF THE PROFESSOR OF ANIMAL INDUSTRY AND FARM SUPERINTENDENT. 133
Dairy Herd, 134; Experiments with Dairy Cattle, 135; Oats *vs.* Oats and Barley, 135; Oats *vs.* Bran, 127; Bran *vs.* Bran and Oil Meal, 138; Bran *vs.* Molac Dairy Food, 139; Bran *vs.* Sugar Beet Meal, 140; Molac Dairy Food *vs.* Tillson's Dairy Food, 141; Experiments with Swine, 141; Feeding Whey, Skim-milk, and Butter-milk, 144.

PART XII. REPORT OF THE LECTURER IN HORTICULTURE 146
Orchard Surveys, 147; Vegetable Gardening, 147; Keeping Test of Onions, 148.

PART XIII. REPORT OF THE PROFESSOR OF LANDSCAPE GARDENING 150
Landscape Gardening, 150; College Campus, 152; School Grounds, 152; School and Home Gardens, 152; Aiding other Public Institutions, 153; Floriculture, 153.

PART XIV. REPORT OF THE PROFESSOR OF POULTRY HUSBANDRY 157
Houses, 157; Large or small Flocks, 158; Late or early Hatched Pullets, 158; Hatching and rearing, 160.

PART XV. REPORT OF THE PROFESSOR OF FIELD HUSBANDRY AND THE DIRECTOR OF FIELD EXPERIMENTS 163
Outline of Work, 164; Experimental Work, 166; Weather, 168; Farm Crops in Ontario, 169; Co-operative Experiments, 173; Influence of Variety, 174; Improvement of Farm Crops, 176; Size of Seeds, 179; Sprouted Wheat for Seed, 180; Shrunken, Broken and Immature Seed, 180; Smut, 180; Flax Seed, 182; Stooling of Cereals, 183; Grain in Mixtures, 185; Barley, 190; Oats, 193; Winter Wheat, 197; Spring Wheat for Flour, 199; Spring Wheat for Macaroni, 200; Rye, 202; Buckwheat, 203; Field Peas, 204; Field Beans, 205; Flax, 206; Millet, 207; Winter Emmer, 208; Sunflowers for Seed, 208; Sorghums for Seed, 208; Cap Yellow Dent Corn, 209; Potatoes, 210; Potato Beetle, 211; Potato Blight, 212; Root Crops, 214; Root Seed, 215; Mangels, 216; Sugar Beets, 217; Turnips, 218; Field Carrots, 219; Kohl Rabi, 219; Parsnips, 219; Corn for Green Fodder, Dry Fodder, and the Silo, 220; Sorghums for Fodder, 223; Sunflowers for Fodder, 224; Millets for Green Fodder and for Hay, 225; Leguminous Crops for Green Fodder, 228; Alfala or Lucerne, 228; Annual Pasture Crops, 230.

PART XVI. REPORT OF THE LECTURER IN ECONOMICS 231

PART XVII. REPORT OF THE DIRECTOR OF HOME ECONOMICS 232
The different Courses 233; Special Lectures, 235; Women's Institute Work, 235; Staff changes, 237; Equipment, etc., 237.

PART XVIII. REPORT OF THE PROFESSOR OF MECHANICS AND MANUAL TRAINING..... 239
Instruction of Normal School Students, 240; The Summer School, 241.

PART XIX. REPORT OF THE PROFESSOR OF FORESTRY 243
College Woodlots and Plantations, 243; Nurseries, 243; Co-operative Planting, 244; Reclamation of Non-Agricultural Lands, 245.

PART XX. REPORT OF THE PROFESSOR OF NATURE STUDY 246
Normal School Students instructed, 246; Course of Study, 251; The use of the Training from the Teacher's standpoint, 267; Teacher's Certificate in Agriculture, 270; Summer School for Teachers, 271; Visits to Country, 273; Training of Teachers in Agriculture elsewhere, 274; O.A.C. Branch of Teachers' Alliance, 275; Trustee Associations, 276; Teachers' Conventions, 276; Distribution of O.A.C. Review in the Schools, 277; Picture of the College in the Schools, 278; Teachers' Reading Course, 278; Extension Work in School Gardening, 279.

PART XXI. REPORT OF THE LECTURER IN APICULTURE 283
Short Course, 284; Bee-keeping, 285; Inspection of Apiaries, 285; Foul Brood, 286; European Foul Brood, 288; Pickled Brood, 289; Problems, 290.

PART XXII. REPORT OF THE DEAN OF RESIDENCE 292

PART XXIII. REPORT OF THE LIBRARIAN 293

PART XXIV. REPORT OF THE PHYSICIAN 294

Respectfully submitted,

G. C. CREELMAN,
President.

Ontario Agricultural College.

PART I.

THE PRESIDENT.

Last year in our Annual Report it was our privilege to record the largest attendance in the history of the College up to that time, viz., 1,225 students in all classes, including the longer and shorter courses in Agriculture and Home Economics. Again we have to report an increase over last year and record 1,296 students in attendance at all classes. This means that the professors, lecturers and demonstrators have all had increased work, and that the class-rooms and laboratories have been overcrowded to a greater extent than ever before. We are pleased to note the continued appreciation of our work by the farmers of the Province, and we are further pleased to think that the other Provinces, as well as other countries of the world, still continue to send us students from year to year.

CHANGES IN STAFF.

It is remarkable that with so many tempting offers to go to other institutions, our staff as a whole remains loyal to this College. Each year we are asked to recommend a number of our graduates for positions of trust in this and other countries, at salaries greater than those paid to our senior professors, and we have young graduates now in agricultural college and experiment station work, to the number of at least a dozen in the United States, receiving from twenty to fifty per cent. higher salaries than those paid to our senior professors.

In the Physical department, Mr. C. C. Thom, B.S.A., resigned the position of Demonstrator in the spring, and Mr. R. R. Graham, B.A., was appointed in his place. Mr. A. H. MacLennan, B.S.A., has been appointed Demonstrator in Poultry Husbandry, his duties to commence the 1st of January, 1910. Mr. M. F. Coglon, B.S.A., resigned his position as Fellow in Chemistry to accept a position as chemist at the Agricultural College in Mississippi, U.S.A. His place was filled by the appointment of Mr. L. D. Jackson, B.A., graduate of McMaster University, Toronto. Mr. A. E. Slater during the year was also appointed to the Chemical department as Demonstrator. The Resident Master, Mr. G. M. Frier, B.S.A., resigned in June to take a position in the department of Agronomy in connection with the Agricultural department of Purdue University, Lafayette, Indiana. Mr. G. H. Unwin, B.S.A., was appointed as Dean of Residence, and he has been unusually successful in his management of the students in the College dormitory. Miss Hardy, College Matron, also resigned in February, and her place was filled by the appointment of Mrs. Margaret Cunningham.

At Macdonald Institute Miss Fonda, Assistant Instructor in Domestic Art, resigned at Easter, and her position was filled by the appointment of Mrs. F. Doughty. At the same time Miss Givin, who has been with Macdonald Institute since its beginning, and whose efficient services have added so much to the success of the institution, on account of ill health was obliged to resign her position as Instructor in Domestic Science. Miss Jean Roddick, of Toronto, was appointed in her place. Miss Edna Ferguson resigns now and leaves on the 1st of January to become Domestic Science teacher in the Collegiate Institute at Berlin. Miss Mary McLennan, a graduate of Macdonald Institute, has been appointed as Instructor in Domestic Science in the place of Miss Ferguson. Miss N. Macmillan, who has been Supervisor of House Practice for the past two years, leaves also on the 1st January to accept a position in Quebec, and Miss E. Maddock, of last year's graduating class, will succeed to the duties of Miss Macmillan on January 1st.

The Minister of Agriculture has seen fit during the year to establish a new department at the College—a department of Apiculture, with Mr. Morley Pettit. of Aylmer, in charge. Arrangements are being made to erect a suitable building for the care and management of bees, and the greater part of the apiary started last year at the Horticultural Experiment Station at Jordan will be moved to the College grounds early next spring. Mr. Pettit has gone about his work in a systematic, business-like way. The lecture periods have been extended from six weeks to three months, and a number of the students are already showing special interest in this work.

Home Economics.

While Macdonald Institute is a comparatively new addition to the College, it has almost from the beginning had sufficient students in attendance to tax the capacity of our class-rooms and to over-tax the teaching staff. Every room in Macdonald Hall has been taken during the last two years, and more than fifty applications had to be refused or held over at the opening in September last. Again we have a waiting list over and above those necessary to fill all the vacancies at the begining of the year, and we must soon decide upon a new policy for regulating the attendance in our Home Economics Classes. We shall either have to increase the capacity of Macdonald Hall and add to the teaching force, or we shall have to restrict the attendance, by refusing applications from young ladies from the cities and accepting only those who come from farm homes. Already we are prepared to discriminate in favor of farmers' daughters, but the difficulty so far has been that while we have had a fair attendance of girls from the farms, they have made application so late that in order to be sure of a full attendance, we have thought it best to accept the applications in the order in which they have been received, and then giving the farmers' daughters applying late a first chance where vacancies occur through the dropping out of early applicants.

College Work and Progress.

The crowding is still more apparent in connection with the men's departments. Every bed has been occupied in the College Residence, and yet nearly a hundred have been obliged to board out. This is to be regretted, as much better work can be done and a much better influence can be exercised over students where they are under the restriction of Residence rules all the time. We are asking this year for a new dining-hall, with servants' quarters on the second floor, and if this can be secured, the present dining-room, store-room, serving-rooms, servants' quarters, and so forth may be converted into additional rooms for College students and so relieve the pressure which is now being brought to bear upon us by students who are obliged to live outside.

The bulletins prepared during the year by members of the College Staff and published by the Department of Agriculture, are as follows:

169. "Legume Bacteria: Further Studies of Nitrogen Accumulation in the Leguminosae,' by S. F. Edwards and B. Barlow.

171. "Insects Affecting Vegetables; Fungus Diseases Affecting Vegetables," by J. W. Eastham and J. E. Howitt.

172. "Dairy School Bulletin,' by the Staff of the Dairy School, Guelph.

174. "Farm Underdrainage; Does it Pay?" by W. H. Day.

175. "Farm Drainage Operations," by W. H. Day.

176. "Bacterial Blight of Apple, Pear and Quince Trees," by D. H. Jones.

177. "Lime Sulphur Wash," by H. L. Fuller and Lawson Caesar.

178. "Character and Treatment of Swamp or Muck Soils," by W. P. Gamble and A. E. Slater.

SHORT COURSES.

These courses continue very popular and are accomplishing more than was at first anticipated. We find a number of young men who take these short courses of a few weeks in the winter time returning for longer courses during the next or subsequent sessions of the College. We also find many men returning year after year for these short courses, some taking more than one course and some remaining for special work in the different College departments at the close of the special course which they came to attend. The attendance in these courses in 1909 was as follows: Dairy Courses, 36; Teachers' Course (Agricultural, Horticulture and Industrial Arts), 134; Short Course in Stock and Seed Judging, 207; Short Course in Poultry Raising, 15; Short Course in Horticulture, 54; One-Month Course in Domestic Science, 11; One-Month Course in Elementary Agriculture and Nature Study, 58; One-Month Course in Manual Training, 26.

STUDENTS OF THE YEAR.

ATTENDANCE.

General Course	439
Specialists in General Course Work	11
Manual Training (One Year Normal Course)	4
Dairy Courses	36
Teachers' Course (Agriculture, Horticulture and Industrial Arts)	134
Short Courses in Stock and Seed Judging	207
Short Course in Poultry Raising	15
Short Course in Horticulture	54
	900

AT MACDONALD INSTITUTE.

Domestic Science	314
Nature Study and Elementary Agriculture (58); Industrial Arts (26)	84
	398
Total	1,298

There were also 131 children from the Guelph Public Schools who received instruction in Domestic Science at Macdonald Institute.

ANALYSIS OF COLLEGE ROLL, (GENERAL COURSE) 1909.

From Ontario.

Algoma	1	Kent	6	Peterboro	2
Brant	9	Lambton	7	Prescott	1
Bruce	7	Lanark	2	Prince Edward	1
Carleton	8	Leeds	2	Rainy River	2
Dufferin	2	Lennox and Addington	3	Russell	4
Dundas	4	Lincoln	9	Simcoe	9
Elgin	6	Middlesex	11	Stormont	1
Essex	1	Muskoka	3	Victoria	4
Frontenac	2	Nipissing	1	Waterloo	12
Glengarry	1	Norfolk	4	Welland	9
Grenville	3	Northumberland	4	Wellington	25
Grey	7	Ontario	14	Wentworth	17
Haldimand	5	Oxford	17	York	34
Halton	9	Parry Sound	2		
Hastings	8	Peel	6	Total for Ontario	295
Huron	5	Perth	5		

FROM OTHER PROVINCES OF THE DOMINION.

Alberta	9	Nova Scotia	9	Saskatchewan	11
British Columbia	24	P. E. Island	1		
Manitoba	2	Quebec	1	Total for other Provinces	58
New Brunswick	1				

FROM OTHER COUNTRIES.

Argentine Republic	1	Ireland	3	Spain	4
Belgium	1	India	2	U. S. A.	19
East Indies	1	Japan	2	Wales	2
England	22	Jamaica	5		
France	1	New Zealand	2	Total for other Countries	86
Germany	1	Scotland	9		
Holland	1	South Africa	10		

AGES AND RELIGIOUS DENOMINATIONS.

The limits of age of students in the General Course, 1909, ranged from 16 to 40 years. The average age was 20.

Baptist	27	Evang. Assoc.	1	No Religion	4
Christadelphian	4	Friends	3	Presbyterian	126
Congregational	7	Hinduism	1	Quaker	1
Disciple	3	Lutheran	1	Roman Catholic	18
Dutch Reform	3	Mennonite	2	Unitarian	2
Episcopalian	110	Methodist	121	United Brethren	5

BACHELORS OF THE SCIENCE OF AGRICULTURE, 1909.

Allan, R. J., Guelph, Ont.
Angle, P. E., Forks Road, Ont.
Bailey, C. F., Kentville, N.S.
Campbell, A. D., Strathroy, Ont.
Coke, E. F., Lynhurst, Mile Gulley, Jamaica.
Cutler, G. A., Roleau, Sask.
Diaz, G., Ferrol, Spain.
Duff, H. C., Dobbington, Ont.
Eastham, A., Guelph, Ont.
Foster, N., Toronto, Ont.
Irvine, W. H., Habermehl, Ont.
Jackson, W. D., Fulton, Ont.
Jones, J. W., Pownal, P. E. I.
Joubert, M. J., O. R. C., South Africa.
Knight, A. A., Brackenrig, Ont.
Lawrence, C. A., Stratford, Ont.
Logsdail, A. J., London, England.
McIntosh, A. D., Guelph, Ont.
McKenzie, N. D., Galt, Ont.
McLaren, A., Edinburgh, Scotland.
Monroe, J. F., St. Anne de Bellevue, Que.
Sirett, H., Rosseau, Ont.
Stafford, E. W., Toronto, Ont.
Thompson, W. R., London. Ont.
Treherne, R. C., Guelph, Ont.
Turney, A. G., Saventhen, Belgium.
Unwin, G. H., Truro, N. S.
Waddell, W. M., Kerwood, Ont.

RECIPIENTS OF ASSOCIATE DIPLOMA, 1909.

Andrew, D. A., Lucknow, Ont.
Austin, R. G., Tottenham, Ont.
Baker, A. C., Harding Hall, London, Ont.
Baker, A. W., Harding Hall, London, Ont.
Baldwin, M. M., Colchester, Ont.
Bradt, E., York, Ont.
Buchanan, C. W., Florence, Ont.
Callister, G., Reading, England.
Clark, T. O., Box 1906, Calgary, Alta.
Clement, F. M., Virgil, Ont.
Coglon, R. B., Coutts, Alta.
Cohoe, D. P., New Durham, Ont.
Culp, A., Vineland, Ont.
Culp, S. H., Vineland, Ont.
Cowie, A. J., Caledonia, Ont.
Dempsey, P. C., Trenton, Ont.
Edgar, F. G., Toronto, Ont.
Emerson, W. W., Foxboro, Ont.
Ewing, A. A., Englehart, Ont.
Filson, H. S., Stella, Ont.
Fisher, P. A., Burlington, Ont.
Forsyth, F., Glasgow, Ont.
Freek, F. M., Barrie, Ont.
Galbraith, C. A., Hornby, Ont.
Gandier, S. H., Lion's Head, Ont.
Henderson, I. B., Hampden, Ont.
Herner, M. C., Mannheim, Ont.
Heurtley, E. W., Ashington, Sussex, England.
Hopkins, E. S., Lindsay, Ont.
Howard, C. F., Hagersville, Ont.
Howell, J. S., Jerseyville, Ont.
Hutchinson, A., Mount Forest, Ont.
Innes, R., Halifax, N. S.
Jones, J. W., Pownal, P. E. Island.
Keegan, H. L., Monkstown, Dublin, Ireland.
King, V., Gravesend, Kent, England.
Lawson, J. D., Brockville, Newport, Scotland.
Light, P., Hensall, Ont.
McAleer, H. A., Chestnut Hill, Philadelphia, U. S. A.
McArthur, Max., Gobles, Ont.
McFayden, C., Caledon, Ont.
McIntosh, A. D., Guelph, Ont.
McKillican, C. G., Vankleek Hill, Ont.
Main, C., Sheffield, Ont.
Marcellus, F. N., North Winchester, Ont.
Marryat, U. G., Alix, Alta.
Martin, L. R., Jordan Harbour, Ont.
Monk, B. F., Springford, Ont.
Orser, O. R., Kepler, Ont.
Orvis, W. G., Dryden, Ont.
Palmer, F., Victoria, B. C.
Peart, G. S., Freeman, Ont.
Presant, J. E., Guelph, Ont.
Ross, W. A., Edinburgh, Scotland.
Schuyler, R., Jarvis, Ont.
Scott, W. R. M., Toronto, Ont.
Shortill, R. J. R., Ballinafad, Ont.
Stafford, E. W., Toronto, Ont.
Strong, W. J., Lanes Farm, Hatfield, Peveral, Essex, England.
Thomson, R. G., Boharm, Sask.
Toole, A. A., Mount Albert, Ont.
Toole, W., Whitevale, Ont.
Whale, I. B., Goldstone, Ont.

FIRST CLASS MEN.

The work of the College is divided into departments, and all candidates who obtain an aggregate of seventy-five per cent. of the marks allotted to the subjects in any department, are ranked as first class men in that department. The following list contains the names of those who gained a first class rank in the different departments, at the examinations held in April, 1909, arranged alphabetically.

FIRST YEAR.

Beckett, R., in one department, English and Mathematics.
Bosman, A. M., in one department, Physics.
Kelly, W. A., in two departments, Biology; Physics.
Knapp, J. S., in two departments, Agriculture; Physics.
McIlquham, J. M., in three departments, English and Mathematics; Biology and Physics.
McTaggart, A., in one department, Physics.
Palmer, E. B., in two departments, Physics; Biology.
Rebsch, C. C., in two departments, Physics; Biology.
Reeves, F. S., in two departments, Physics; Biology.
VanSickle, P. O., in four departments, English and Mathematics; Physics; Biology and Agriculture.
Weir, E. A.. in three departments, English and Mathematics; Chemistry and Physiology; Biology.

SECOND YEAR.

Baker, A. C., in one department, Biology.
Dorrance, H. A., in one department, English.
Emerson, W. W., in one department, English.
Palmer, F., in one department, Biology.
Strong, W. J., in two departments, English and Biology.
Toole, W., in three departments, English; Biology and Agriculture.

SCHOLARSHIPS.

Scholarships of $20 each in money were awarded for groups of subjects in first year work as follows: Highest standing with a minimum of forty per cent. of the marks for each subject, and an aggregate of seventy-five per cent. of the total number of marks allotted to the subjects in the group:

English and Mathematics, E. A. Weir, Randwick, Ont.
Agriculture, P. O. VanSickle, Trinity, Ont.
Biological Science, F. S. Reeves, Ash Church, Tewkesbury, Gloucestershire, England.
Physical Science, J. M. McIlquham, Lanark, Ont.

THE GEORGE CHAPMAN SCHOLARSHIP.

A prize of $20 in books awarded on the work in English of the first two years. The three divisions of the work under the English Department are taken into consideration in awarding the prize, namely, English Literature, English Composition and Public Speaking. Winner in 1909: H. A. Dorrance, Seaforth, Ont.

PRIZES.

Three prizes of the value of $10 each in books, were awarded as follows:

One to the second year student who composed and read before a committee the best essay on the subject assigned for the year, viz., "The Farmer in Politics." Winner: W. W. Emerson, Foxboro, Ont.

One to the student who stoood first in general proficiency on first and second year work—Theory and Practice—Wade Toole, Whitevale, Ont.

One to the student who ranked highest in general proficiency and obtained first-class honours in his major subjects in the fourth year. Winner: W. R. Thompson, London, Ont.

MEDALS.

Governor-General's Silver Medal: First in General Proficiency, First and Second Year work, 1908-1909. Winner: Wade Toole, Whitevale, Ont.

Barton-Hamer Gold Medal: Awarded to that member of the O. A. C. International Live Stock Judging Team, securing the highest number of marks in the Student's Judging Contest, held annually at Chicago. Winner: N. D. McKenzie, Galt, Ont.

CASH PRIZES WON AT GUELPH WINTER FAIR.

On Friday, December 10th, at the Guelph Winter Fair, a judging competition in Live Stock was held for young men twenty-five years of age and under. The competitions were in charge of Prof. G. E. Day, R. S. Stevenson, J. E. Brethour, and J. Jackson. Sixty per cent. of the points was given for placing, forty per cent. for reasons. The O. A. C. students who won in the various classes are as follows:

Beef Cattle: First, W. A. Kelly; second, D. S. Macdonald; third, T. S. D. Harding; fourth, W. N. Campbell; fifth, W. J. Fraser; sixth, C. J. Ackers; seventh, A. McTaggart; eighth, W. V. Longley; ninth, J. C. Yule; tenth, W. B. Milner.

Dairy Cattle: First, G. S. Dunkin; second, J. N. Sorley; third, J. M. McIlquham; fourth, H. King; fifth, Outsider; sixth, G. Wilson; seventh, A. A. Whaley; eighth, W. H. Moore; ninth, H. H. Lindesay; tenth, J. A. Carroll.

Horses: First, M. C. Herner; second, A. A. Toole; third, J. C. Steckley; fourth, R. L. Rutherford; fifth, I. B. Whale; sixth, E. W. Heurtley; seventh, J. E. Smith.

Sheep: First, J. Laughland; second, J. C. Yule; third, Outsider; fourth, A. McTaggart; fifth, S. A. Bergy; sixth, J. E. Rettie; seventh, C. M. Learmonth; eighth, A. M. Bosman; ninth, J. M. Falconer; tenth, J. B. Grange.

Swine: First, E. B. Palmer; second, F. W. Renwick; third, P. Stewart; fourth, W. A. Kelly; fifth, S. H. Clark; sixth, Outsider; seventh, C. A. Barnett; eighth, A. W. Pate; ninth, G. C. Miller; tenth, F. A. Bennett.

Professional Dairy School Certificates Issued During 1909.

Freeman, Wm. A., Condersport, Pa., U. S. A.	Cheesemaking
Miller, A. Alex., Jarvis, Ont.	Buttermaking
Yone Yama, Y., Yamura, Machi, Yamanashi, Ken, Japan	Buttermaking

Recipients of Teachers' Certificate in Domestic Science.

A.—Graduates of Two-year Normal Class:

Miss Miriam A. Ames, Toronto, Ont.
" Gladys M. Black, Acton, Ont.
" Edna E. Hartley, Brantford,
" Anita E. Hill, Guelph, Ont.
" Katherine James, Charlottetown, P. E. I.
Miss Mary Longstreet, Brantford.
" Annie MacDonald, Lanark.
" Bessie H. Peebles, Hamilton.
" Beatrice L. Williams, Pewamo, Mich., U. S. A.

B.—Graduates of One-year Normal Class:

Miss Emily Blenner-Hassett, Mount Forest, Ont.
" Ethel E. Gromitt, Toronto, Ont.
Miss Netta M. Nixon, St. George,
" Ellen E. Pearson, Stratford,
" Susan L. Tyson, Wiarton, Ont.

Recipients of Housekeeper Certificate.

Miss Jessie Blyth, Marden, Ont.
" Mary B. Daniel, Pugwash, Nova Scotia.
" Maud Davison, Cannington,
" Eliza Maddock, Guelph, Ont.
Miss Marion K. Rutherford, Owen Sound, Ont.
" Charlotte Scott, Perth, Ont.
" Nealina Macmillan, Guelph,

Recipients of Professional Housekeeper Certificates.

Miss Jean G. Allan, graduated, 1905.
" Ethel Tennant, graduated 1905.
" Erie Shand, graduated 1906.
" Jennie McKenkie, graduated 1906.
Miss Sarah Bray, graduated, 1907.
" Robena Murdoch, graduated 1907.
" Mabel Mortimer, graduated 1907.

Recipients of Homemaker Diploma.

Miss Helen Bankier, Hamilton, Ont.
" Grace Bray, Nashville, Ont.
" Jeanie Bray, Nashville, Ont.
" Helen G. Cassels, Toronto, Ont.
" Winifred Cooper, Montreal, Que.
" Gladys Forster, St. Andrews, N.B.
" Helen Fowler, Winnipeg, Man.
" Eleanor Greig, Almonte, Ont.
" Fanny Harris, London, Ont.
" Louise Julyan, Leith, Ont.
" Ilda Madden, Orillia, Ont.
" Eva McCall, Vittoria, Ont.
" Frances MacKeen, Glace Bay, N.S.
" Annie Palmer, Norwich, Ont.
" Margaret Peart, Freeman, Ont.
" Annie Pettingell, Quispamsis, N.B.
" Hilda Rochester, Westboro, Ont.
" Annie Thompson, Moose Jaw, Sask.
" May Walker, Floradale, Ont.
" Marjorie Wallace, Toronto, Ont.
" Eveline Whitney, Hamilton, Ont.
" Frances R. Young, Kentville, N.S.
" Eva Tweddle, Fruitland, Ont.

SUMMARY OF ATTENDANCE—MACDONALD INSTITUTE.

A.—January to June, completing the College year of 1908-1909.

Normal Students:	35
(*a*) Seniors—Two year, 10; (*b*) Seniors—One year, 5; (*c*) Juniors, 20.	
Housekeepers:	14
(*a*) Seniors, 7; (*b*) Juniors, 7.	
Homemakers:	34
(*a*) One year, 31; (*b*) Two years, 3.	
Short Course in Domestic Science:	88
(*a*) Winter term, 48; (*b*) Spring term, 40.	
Short Course in Sewing (Spring term only):	8
Optional:	10
Student-workers:	6
Public and High School Students:	76

B.—Summer Course in Domestic Science	11

C.—September to December, opening the College year of 1909-1910.

Normal Students:	41
(*a*) Seniors—Two year, 21; (*b*) Seniors—One year, 4; (*c*) Juniors, 16.	
Housekeepers:	17
(*a*) Seniors, 6; (*b*) Juniors, 11.	
Homemakers:	31
(a) One year, 30; (b) Two year, 1.	
Short Course in Domestic Science:	30
Short Course in Sewing:	11
Optional:	3
Student-workers:	4
Public and High School Students:	55
Total	474

D.—Students counted in both lists:

In two year courses	25
In Public and High School Classes	4
Total	29

E.—Total number of students in 1909	445
F.—Total number of students in 1908	414

STOCK JUDGING.

Again we sent a team of Fourth Year students to the International Live Stock Exposition held in the city of Chicago in the early days of December. The team was composed of the following men: W. E. J. Edwards, Balsam, Ont.; R. L. Moorehouse, Cairo, Ont.; W. R. Reek, Romney, Ont.; A. M. Shaw, Niagara Falls, Ont., and O. C. White, Ashburn, Ont. While not successful in securing the first prize this year, they made a remarkably good showing, standing second in general proficiency for horses, cattle, sheep, and swine. Mr. O. C. White stood second in the entire list of competitors, and Mr. Reek stood 9th. The standard has evidently been raised in this competition from year to year. When our Mr. Hamer in 1907 stood first in general proficiency over all competitiors, he had but nine marks in the aggregate higher than our Mr. Reek of this year's class, who stood but 9th.

When we take into consideration that many of the classes of live stock, particularly in horses and swine, are entirely different in conformation and type from the breeds commonly bred and exhibited in Canada, we will realize that our students are very badly handicapped, in comparison with the students from American colleges, who have the privilege of practising on all the classes of stock that are brought before them at the time of the international competition.

The men on our staff who prepare a new class for Chicago each year, and also prepare scores of young men who annually take part in the judging competitions at our own Provincial Winter Fair, deserve great credit for the standard and proficiency to which these young men attain.

EXCURSIONS.

The month of June was again devoted to Farmers' Institute excursions, and again from all parts of the Province came farmers in large numbers each day, to look over the College and the College Farm. It is remarkable that these men come back to the College year after year, and each time seem to take a greater interest in the work than ever before. The questions asked are more pertinent, the numbers who tramp all over the farm grow larger; and those who come for mere enjoyment or a day's outing seem to be fewer in number each year. It is gratifying to see the continued interest the farmers are taking in the work we are doing.

The College also entertained the members of many organizations directly or indirectly interested in our work, and during the year the following associations visited us:

June 3 and 4, East and West Lambton Teachers' Association;
June 10 and 11, East and West Kent Teachers' Association;
June 19, Toronto Canadian Club;
June 26, International Congress of Women;
Nov. 4 and 5, Canadian Entomological Society.

WOMEN'S INSTITUTES.

This organization has become a powerful factor in our rural economy. Thousands of women, in the aggregate, meeting in small numbers all over the Province, are already showing their influence on the farming community. The life in the farm home is not so monotonous; more and better reading matter is being introduced, and the farmer's wife and daughter, through the Women's Institute, has an avenue for the exchange of ideas and for the exercise of their social natures, such as they have never had before. At the Annual Convention at the College in December, Massey Hall was again crowded to its utmost capacity by the delegates from the different Institutes. The papers and discussions, which I trust will all be published in the Report of the Women's Institute Work, should make very interesting reading, indeed, for those who live in farm homes.

EXPERIMENTAL UNION.

As usual, the first day of the Union was not well attended. As it was, the President and those who arrived at the College in time for the opening exercises were obliged to leave home on the previous Saturday. Acting, then, upon our suggestion in last year's report, the executive committee were instructed to carefullly consider the advisability of changing the date of the Experimental Union to some time in January, during one of the Short Courses. This will insure a larger attendance of farmers, and it will give our students, who have not examinations immediately ahead of them, an opportunity to attend all of the meetings. It will give the members better hotel accommodation in Guelph than if held, as usual, at the time of the Winter Fair, and it will give those who are conducting work for the Experimental Union a little more time in which to prepare their reports for the meeting. Further than that, it will give the officers of the Union an opportunity to spread their work out a little more. As it is now, having only three sessions, the work has to be condensed too much, and it is not at all satisfactory. Again, those members of our staff and of the student body who assist at the Winter Fair, who have not now an opportunity of attending the sessions of the Experimental Union, will all be able to attend all of the meetings, if the change of date be made, as suggested.

Outside Lecturers.

A number of excellent lectures were delivered before the members of our student body in Massey Hall at regular intervals during the year. These lectures proved very interesting and instructive, and we are obliged to the following persons for the assistance which they have rendered to us:

Prof. W. J. Alexander, University of Toronto, Toronto.—"Shakespeare."
Dr. J. W. Robertson, Macdonald College, Que.—"The New Education."
Rev. John Anthony, Agincourt.—"Birds."
Miss Field, Toronto.—"English Literature."
Prof. H. T. J. Coleman, University of Toronto, Toronto.—"Geology."
Mr. E. S. Williamson, Toronto.—"Dickens."
Mr. E. S. Williamson, Toronto.—"Dickens."

Agricultural Specialists in County Towns.

Three more agricultural specialists were added to the list in June last, making eleven graduates now engaged in this work. The new men were: H. C. Duff, for Peterborough County, located at Norwood; H. Sirett, for Carleton County, located at Carp, and P. E. Angle, for Norfolk County, located at Simcoe. These eleven men are all enthusiastic in their work and seem to be highly successful in it. They are forming farmers' clubs, holding short courses in stock and seed judging and in fruit growing, growing experimental plots, experimenting with fertilizers, establishing school gardens, holding agricultural exhibitions for school children, giving farmers plans of their farms for tile drainage, conducting spraying demonstrations in orchards, preparing education exhibits and giving instruction at fall fairs, encouraging co-operative societies among farmers, and teaching pupils in the local high schools. These are some of the things in which these young men have interested themselves, and we trust that some day the money may be found to place one or more of these men in every county of the Province.

Financial Statement.

I append the Financial Statement prepared by Mr. S. Springer, Bursar. It for the ten months, January to October inclusive, to correspond with the change in the fiscal year of the Provincial Legislature.

I have the honour to be,

Your obedient servant,

Guelph, December 20, 1909. G. C. CREELMAN.

FINANCIAL STATEMENT.

(10 months, Jan. 1st to Oct. 31st, 1909.)

COLLEGE DEPARTMENT.

EXPENDITURE.

Salaries and wages	$51,048 68
Servants' paylist (including laundryman)	2,955 00
Meat, bread, groceries, laundry, engine room supplies and fuel	30,327 51
Advertising, printing, postage and stationery	3,373 87
Maintenance, 5 laboratories and gymnasium	3,983 91
Expenses, short courses	1,194 79
Temporary assistance	1,050 92
Student labor	3,257 68
Travelling expenses and extra lectures	1,489 20
Library	1,677 09
Scholarships	80 00
Telephone service, rent, etc.	395 50
Furnishings and repairs	3,987 87
Sewage	406 10
Contingencies	850 50
Total Expenditure	$106,078 62
Less Revenue	30,007 31
Net Expenditure	$76,071 31

REVENUE.

Board	$18,140 25
Tuition and laboratory fees	10,807 50
Supplemental examinations	101 00
Chemical analyses	162 50
Rent of cottages	182 50
Rent of rooms	121 50
Rent of Post Office boxes	39 50
Fines and breakages	447 16
Sundries	5 40
Total Revenue	$30,007 31

STUDENT LABOR.

Total per Month.

January	$604 21
February	506 08
March	471 91
April	214 46
May	318 68
June	195 19
July	175 84
August	223 14
Sept. and October	548 17
	$3,257 68

To Different Departments.

College Department	$205 82
Macdonald Institute	51 45
Chemical Laboratory	125 35
Bacteriological	14 24
Entomological	88 68
Physical	86 67
Botanical	20 90
Library	83 53
Farm Department	638 20
Experimental	1,045 13
Poultry	260 21
Horticultural	286 52
Dairy Department	34 20
Mechanical	316 78
	$3,257 68

MACDONALD INSTITUTE AND HALL.

EXPENDITURE.

Salaries and wages	$13,319 50
Servants' pay list	1,523 00
Bread, meat, groceries, furnishings, repairs, engine room supplies and fuel, and labor on grounds	10,494 73
Maintenance of laboratories in Institute	2,398 61
Library and stationery	468 29
Total Expenditure	$28,204 13
Less Revenue	19,074 36
Net Expenditure	$9,129 77

REVENUE.

Board	$12,409 60
Tuition and laboratory fees	6,396 60
Supplemental examinations	4 00
Fines, breakages and food purchases by students	152 46
Sale of supplies to Manual Training students	111 70
Total Revenue	$19,074 36

FARM DEPARTMENT.

EXPENDITURE.

Permanent improvements	$419 96
Wages of men, foreman and stenographer	5,569 71
Purchase of live stock	3,276 53
Maintenance of stock	2,646 09
Farm maintenance (including repairs, blacksmithing, binder twine, seed, furnishings, fuel, light, advertising, printing, stationery, tools, implements, etc.	1,941 69
Contingencies	232 03
Total Expenditure	$14,086 01
Less Revenue	7,048 07
Net Expenditure	$7,037 94

N.B.—Nothing allowed the Farm Department for the feed, etc., of the department horses, and supplies for the College and Macdonald Hall, including milk.

REVENUE.

Sale of cattle:—		
27 steers, 34,880 lbs., at from 5 to 7 cts.	$1,964 50	
1 bull for	80 00	
1 cow, 1,590 lbs., at 6 cts.	95 40	
5 cows at from $35 to $60	230 00	
1 heifer for	50 00	
8 calves for	390 00	
		$2,809 90
Sale of pigs:—		
156 hogs, 32,250 lbs., at from 5½ to 8.1 cents	$2.333 64	
12 hogs at from $2.50 to $10.00	76 00	
3 sows, 1.015 lbs., at from 4 to 6½ cents	47 22	
1 sow for	30 00	
		2,486 86
Sale of sheep:—		
16 lambs at from $4.00 to $10.00	$107 00	
2 sheep at $6.00	12 00	
1 sheep, 210 lbs., at 4½ cents	9 45	
		128 45

Sale of horses, 2 for		625 00
Service of animals		93 00
Sale of wool, 442 lbs. at 12½ cts.		55 25
" 1 horsehide		2 50
" 2 sheepskins at $1		2 00
" 6 bags small potatoes at 25 cts.		1 50
" 11 bags at 25 cts.		2 75
" grain,, 39 bus. wheat at from $1.25 to $1.50		56 25
Sale of Milk:—		
9,675 qts. at 4 cts.	$387 00	
1429.47 lbs. fat at from 24 to 34 cts.	390 18	
3713 lbs. skim-milk at 20 cts.	7 43	
		784 61
Total Revenue		$7,048 07

EXPERIMENTAL DEPARTMENT.

Expenditure.

Permanent improvements	$599 98
Assistant, specialist in plant breeding, stenographer, foreman, teamsters and laborers	7,794 88
Seeds, manure and special fertilizers	546 64
Furnishings, implements, repairs, blacksmithing, etc.	580 00
Printing, postage, stationery, contingencies, etc.	279 85
Purchase of horse	225 00
Total Expenditure	$10,026 35
Less Revenue (Sale of 1 horse)	120 00
Net Expenditure	$9,906 35

DAIRY DEPARTMENT.

Expenditure.

Permanent improvements	$396 25
Wages, including foreman, cheesemaker, buttermaker, engineer, stenographer and bookkeeper, assistant and official tester of dairy cattle	2,542 00
Purchasing, hauling and manufacturing milk into butter and cheese	3,345 20
Furniture, furnishings, repairs, etc., laboratory expenses, gas, chemicals, etc., and contingencies	798 97
Fuel and light	235 31
Total Expenditure	$7,317 73
Less Revenue	5,122 23
Net expenditure	2,195 50

Revenue.

Sale of butter, 111 lbs. at from 15 to 26 cts.		$20 50
" cheese, 14,180 lbs. at from 6 to 13 cts.		1,653 99
" cream, 570 qts. at 20 cts.		114 00
" fat, 590.68 lbs. at from 25.5 to 33 cts.		163 06
" skim-milk, 48,030 lbs. at from 10 to 20 cts.		67 38
" buttermilk, 106,170 lbs. at from 10 to 40 cts.		121 78
Milk tests		107 30
Rent of house		90 00
Manufacturing butter:—		
14,025.66 lbs. at 3 cts.	$420 77	
59,085.94 lbs. at 4 cts.	2,363 45	
		2,784 22
Total Revenue		$5,122 23

DAIRY SCHOOL.

Expenditure.

Permanent improvements, cement floors, walks, etc.,	$99 90
Wages of instructors, engineer, janitor, stenographer and book-keeper	2,515 00
Cleaning, painting, repairs and contingencies	282 08
Dairy appliances, separators, vats, expenses, cheese and butter judges, inspecting factories, etc.	447 29
Advertising, printing, stationery, postage, books, papers, etc.	111 82
Fuel and light	594 34
Purchase of milk for cheese-making, and cost of hauling milk and cream	2,377 91
Total Expenditure	$6,428 34
Less Revenue	1,832 91
Net expenditure	$4,595 43

Revenue.

Fees		$80 00
Breakages		1 20
Sale of butter, 18 lbs. at 18 cts.		3 24
" cheese, 8,353 7-8 lbs. at from 5 to 23½ cts.		1,009 78
" fat, 36.16 lbs. at 33 cts.		11 93
" skim-milk, 20,189 lbs. at from 15 to 40 cts.		33 91
" buttermilk, 26,940 lbs. at from 10 to 40 cts.		33 65
Manufacturing butter:—		
2,726.81 lbs. at 3 cts.	$81 81	
14,434.79 lbs. at 4 cts.	577 39	
		659 20
Total Revenue		$1,832 91

POULTRY DEPARTMENT.

Expenditure.

Wages of assistant, stenographer, and temporary assistance	$860 00
Furnishings and repairs	824 14
Permanent improvements	76 49
Purchase of stock	165 21
Fuel, light and contingencies	274 99
Experiments with incubator, fattening and feed	1,986 80
Total Expenditure	$4,187 63
Less Revenue	2,085 62
Net Expenditure	$2,102 01

Revenue.

Sale of eggs for hatching:—		
241 settings at from 75 cts. to $2	$268 90	
3,047 eggs at from 5 to 7½ cts. each	152 15	
		$421 05
Sale of eggs for domestic use:—		
1,823 1-12 doz. at from 15 to 40 cts.		439 42
Sale of live poultry, 244 live birds for		381 00
Sale of dressed poultry:—		
4,153 9-16 lbs. at from 8 to 15 cts.	$513 30	
926 3-4 lbs at from 20 to 50 cts.	297 70	
15 pairs broilers at from 75 cts. to $1.25	13 75	
11 ducks at 50 cts.	5 50	
3 pairs ducks at $1.25	3 75	
24 squabs at 25 cts.	6 00	
		840 00
Sale of 10 lbs. duck feathers at 25 cts.		2 50
Sale of 100 lbs. grain for		1 65
Total Revenue		2,085 62

HORTICULTURAL DEPARTMENT.

EXPENDITURE.

Permanent Improvements	$298 56
Head gardener and foreman, assistant in plant breeding, assistant and night fireman, teamsters, assistant gardener, stenographer and laborers	5,724 50
Manure, trees, plants, seeds, cold storage experiments, implements, tools, furnishings, repairs and contingencies	1,699 45
Fuel and light	679 72
Wax fruit models	399 81
Purchase of horse	250 00
Total expenditure	$9,052 04
Less Revenue	104 27
Net Expenditure	$8,947 77

NOTE:—Products supplied to College and Macdonald Hall except when more than required.

REVENUE.

Sale of 25 squash for	$ 1 23
Sale of 22¾ crates strawberries at $1.00	22 75
Sale of 83 bus. onions for	59 16
Sale of 2,113 feet rough spruce at $10.00 per M.	21 13
Total Revenue	$104 27

MECHANICAL DEPARTMENT.

EXPENDITURE.

Salary of foreman	$667 00
Tools, furnishings and repairs	198 98
Total Expenditure	$865 98

SOIL PHYSICS DEPARTMENT.

EXPENDITURE.

Services and expenses of temporary assistants in connection with Farm Drainage Demonstrations	$1,000 00

FORESTRY DEPARTMENT.

Forestry contingencies	$1,249 58

SUMMARY, 1909.

	Expenditure.	Revenue.	Net Expenditure
College	$106,078 62	$30,007 31	$76,071 31
Macdonald Institute and Hall	28,204 13	19,074 36	9,129 77
Farm	14,086 01	7,048 07	7,037 94
Experimental	10,026 35	120 00	9,906 35
Dairy	7,317 73	5,122 23	2,195 50
Dairy School	6,428 34	1,832 91	4,595 43
Poultry	4,187 63	2,085 62	2,102 01
Horticultural	9,052 04	104 27	8,947 77
Mechanical	865 98	....	865 98
Soil Physics	1,000 00	....	1,000 00
Forestry	1,249 58	....	1,249 58
	$188,496 41	$65,394 77	$123,101 64

S. SPRINGER,

Bursar and Superintendent.

PART II.

THE PROFESSOR OF ENGLISH.

To the President of the Ontario Agricultural College:

Sir,—I have the honor to present herewith my fifteenth annual report for the department of English.

The course in English at this institution is much more thorough and extensive than is generally understood. The character and extent of the course have been arrived at from the experience of many years in teaching the subject with classes in Agriculture. The course now is, I believe, in a fair way of becoming what it should be, namely, both practical and cultural. In the department of English Literature proper, we have the four years' course, consisting of two lectures a week on English authors. The course has for its purpose to make the students acquainted with the chief English authors, so that the works of these authors may become familiar companions to the students who follow the course. This course, besides, gives to the students a fund of ideas of practical or cultural value which make them, to the extent to which those ideas become their own, intelligent and cultured men. Also, a study of these authors cannot fail to widen the vocabulary; and, lastly, the general literary style of the student is, consciously or unconsciously, purified and heightened by a study of the literary styles of our best authors.

The work in Composition also extends through four years. The whole emphasis of this course is practical. By regular and systematic practice in English Composition students are enabled to write with clearness, fluency and force. To make the work practical, however, imposes great labor on the instructors, and is beset with many difficulties. The labor arises from the increasing number of students in attendance. Each man's work must be read and estimated by the instructor, and the work in this direction is exactly proportional to the number of students. The difficulty in teaching the subject arises out of the variety in attainments, especially among the students of the first year. It is extremely difficult to adapt the instruction given to a class of fifty or more students to the particular needs of the individual students, and also difficult to adopt a standard of excellence which is both effectual and just to all the members of the class. In spite of these difficulties, however, I am glad to be able to report real and substantial progress among our classes in the art of composition.

Public Speaking is now a recognized department of instruction and practice in the course in English. Last year there were two classes a week with every second year student during the winter term, and with every third year student three classes a week. These classes were entirely practical, each student, without exception, being required to deliver addresses of five to ten minutes in length as often as time would allow, each student taking his turn on the platform. The instructor limited his duties strictly to general and particular criticism of the work. There was no attempt to give a series of formal lectures on the art of speaking, though incidentally the principles of good platform work were necessarily involved in some of the criticisms. This work, too, is now, I believe, on the right footing, and all that is further needed to make the course quite satisfactory is a sufficient amount of time so that each student shall have practice enough to make him feel at home on the platform; and an instructor who can give his mind specially to the work. It seems to me that when a College can afford to employ a gymnasium instructor, and the Athletic Society can afford to employ a football coach, the time has surely come when we can afford a coach for Public Speaking. The intercollegiate debates this year have gone by default, partly because of the fact that in previous years our students have been handicapped in competition with the students from other Colleges from the want of sufficient practice and proper coaching. It stands to reason that a special art like Public Speaking deserves special coaching quite as much as does football. I hope that the matter of providing a coach for the Public Speaking classes may receive early and adequate attention.

This year I have been enabled to add to the course in English a series of lectures on Agricultural Journalism. A number of journalists engaged on the Agricultural press of Ontario have kindly agreed to address our students on particular phases of their work, and I hope during the winter term of this year to commence this course. On account of the frequent absence from the College of a large section of the fourth year class in live stock judging, it has been impossible so far to arrange for any of the lectures in this course, but there will be time during the coming winter term.

It gives me much pleasure to commend the work done by Mr. H. H. LeDrew and Mr. G. H. Unwin, as assistants in the department of English. Both are very painstaking and effective, and the success of the work in English very largely depends on their skill and interest in the work.

Respectfully submitted,

J. B. REYNOLDS.

PART III.

THE PROFESSOR OF ENTOMOLOGY AND ZOOLOGY.

To the President of the Ontario Agricultural College:

Sir,—I have the honor to present my fourth annual report on the work of the department of Entomology and Zoology. The instruction of the students in the subjects prescribed by the curriculum is, naturally, our first and most important duty, and accordingly the greater part of our time is devoted to the lectures and laboratory work and the necessary preparations for them. The increased number of students in the different years has taxed our accommodation to the utmost, and during the current term has compelled us to make two divisions of the Third Year for practical study, one laboratory being insufficient to hold them all. With the able and energetic assistance of my colleagues, Messrs. Tennyson D. Jarvis and Lawson Caesar, a thorough course of instruction in Entomology, both systematic and economic, has been given, beginning with the First Year, continued in the Second, and completed in the Third Year. The students of the Fourth Year who select the Biological Option have a more advanced course in systematic Entomology. There is also given an elementary series of lectures on Zoology in the First Year and in the Fourth Year much time is devoted to advanced work in the laboratory on Zoology, Animal Histology, Physiology and Anatomy. Mr. Jarvis has also given a course on Biology extending over both terms to the Senior Normal students of the Macdonald Institute, and a series of afternoon lectures to the members of the Poultry Short Course, in January, on bird parasites and the outlines of Entomology.

The change regarding Nature Study in the Third Year has proved quite satisfactory. Instead of keeping these students at the College from the middle of April to the end of May, during which time they were expected to receive much of their instruction and to make their observations out-of-doors on birds, small animals and insects, as well as upon the flora of the country, when oftentimes the weather was too inclement for anything of the kind, this year they were permitted to leave at the close of the terminal examinations. They were, however, required to keep a record of natural phenomena in their own neighborhood and to note from day to day their observations of animals of all kinds, of weeds, etc. These note books, together with any collections made, were submitted on their return in September and an oral examination tested their knowledge of common objects. In nearly all cases these conditions were satisfactorily complied with and the relief from a prolonged stay at the College without sufficiently compensating advantages was highly appreciated.

The large class of Normal School students who filled the College after the departure of the men in April gave us a new experience in the teaching of Nature Study. The ninety-four young women who completely filled my lecture room were given a course of instruction on common insects, their general classification, economic importance, and interesting life histories. As ten weeks were spent with us there was ample time for making the course a fairly complete one. Each student was required to collect at least fifty specimens of insects and as far as possible to name them. This work supplemented the lectures and gave an opportunity for individual instruction which, with so large a class, it was rather difficult otherwise to carry out.

It was highly gratifying to note the keen interest that was taken in the lectures and the enthusiasm for the study of the common objects of nature that was gradually aroused. The knowledge acquired and the methods of observation imparted will evidently be of much value to these young teachers in their country schools, and in many a rural district the children may be brought to observe and take an interest in the natural objects that surround them and be guided by their teachers to do so in a useful and satisfactory manner. So far as this department was concerned the experiment tried for the first time this year was fully justified.

The month of July was occupied with the summer school of Ontario teachers who came to us in much larger numbers than in previous years. The shortness of the time and the effort to give instruction in Zoology as well as Entomology, rendered our work less satisfactory than formerly. The increased size of the classes also made out-door instruction more difficult and reduced the amount of individual attention. While we felt our shortcomings and regretted our inability to accomplish all that we should like to have done, it was some compensation to know that our efforts to instruct these teachers were much appreciated by them, and that in many cases they were attracted to the study of nature as never before, and left us with the intention of devoting more time and attention to reading and observation in this wide field of knowledge. After courses of lectures and instruction so long and so varied, those responsible for them were by no means sorry when August came as a month of relief and a much appreciated holiday. It may be mentioned that these prolonged courses of instruction have prevented Mr. Jarvis and myself from carrying out research or field work to any great extent. Mr. Caesar, however, being free from lectures after the conclusion of the regular College course, has been able to visit various fruit growing districts and to complete a variety of experiments in connection with fungus diseases and injurious insects.

At the final examination conducted by the University of Toronto for the degree of B.S.A. in May last, all the Fourth Year students, who had selected the Biological Option, were successful. Of these Mr. W. Robin Thompson ranked highest in general proficiency and obtained first-class honors in the major subjects of the Fourth Year, thus winning the prize of $10 in books. Mr. Thompson has since been appointed to take charge of the work at Melrose Heights, Mass., connected with the importation and breeding of Dipterous Parasites for the control of the Gypsy and Brown-tail moths—a position of considerable importance and much responsibility. Mr. A. Eastham, who came second in the final examinations, has been appointed temporary assistant in the Botanical Department of this College. Mr. R. C. Treherne is employed by the Ontario Department of Agriculture as one of the Provincial Inspectors of Nurseries. Mr. E. W. Stafford is in charge of Insectary work at the Agricultural Experiment Station, St. Anthony Park, Minn., and Mr. G. H. Cutler has been appointed assistant Agronomist at Macdonald College, Ste. Anne de Bellevue, P.Q. It is very gratifying to find that year after year our students obtain excellent positions immediately after completing their College course, and still more satisfactory to learn, as we do, that they are well equipped for their work and perform the duties assigned to them in a thoroughly efficient manner.

Of the present Fourth Year students only three are taking the Biological option; they have all selected Entomological subjects for the theses that they are required to present at the close of next term and are now carrying on the scientific investigations that are necessary for the completion of their tasks. Mr. Roy Fraser is studying the Cynipid Galls of Ontario; Mr. J. D. Tothill, the Dipterous flies of the super-family Muscoidea; and Mr. S. J. Neville the Water Mites (Hydracnidæ).

In the Second Year about twenty of the students have selected Entomological subjects for their theses, and have consequently referred to us for assistance in outlining and planning their work.

OUTSIDE LECTURES.

Besides the regular courses of lectures in College, we, in common with many other members of the staff, are called upon to address audiences in other places; lectures of a popular and practical character were accordingly given in January at Brampton and to those attending the Stock Short Course here; in February to the Canadian Institute, Toronto; in April at St. Thomas's Church-house, Toronto, and in June to the Lambton Teachers' Association.

Mr. Jarvis in January gave an address before the Canadian Institute, Toronto, on "Gall Insects," and a lecture to the Short Course in Horticulture on "Insect and Fungus Diseases of Fruit Trees." In November he addressed the Canadian Horticultural Association at its annual meeting in Toronto on "The Relative Value of Insecticides."

Mr. Caesar has given a number of addresses on Insects and Diseases Affecting Fruit Trees and other Cultivated Plants at Picton (2), St. David's (2), Crowland (2), Humberstone (2), Lindsay, Beamsville, Stoney Creek, Port Perry (2), Cobourg (2), Trenton, Whitby (2), Dunnville, Forest (2), Simcoe, Broadview Boys' Institute, Toronto; and addresses to the American Pomological Society on "The Control of the Codling Moth," and to the Fruitgrowers' Association at its November Convention in Toronto on "Lime-sulphur Wash *vs.* Bordeaux Mixture for Summer Spraying of Apple and Pear Orchards." Orchard demonstrations with addresses were given at Oshawa, Ayr, and New Hamburg, and a visit was made to Collingwood to investigate an outbreak of Wireworms.

PUBLICATIONS.

In April Bulletin 171 on Insects and Fungus Diseases affecting Vegetables (64 pages, 58 illustrations) prepared in co-operation with Messrs. J. W. Eastham and J. E. Howitt, the lecturers in Botany, was published by the Ontario Department of Agriculture. In addition to editing the monthly issues of the *Canadian Entomologist* and the Annual Report to the Legislature of the Entomological Society of Ontario, I have contributed a number of short articles in answer to enquiries in the *Farmer's Advocate* and other journals, and a paper on "Some of the Injurious Insects of 1909 in Ontario" to the Report of the Entomological Society. In the Transactions of the Royal Society of Canada has been published my ninth annual "Bibliography of Canadian Entomology."

Mr. Jarvis, who has been re-elected President of the Entomological Society of Ontario, has contributed to its Annual Report articles on "the Scale Insects of Ontario"; "Further Notes on Gall Insects"; and "The Mites (Acaridae) of Ontario"; and has furnished short articles bearing on Economic Entomology to the *Canadian Horticulturist* and other publications.

Mr. Caesar has contributed the following articles: "The Shot-hole Borers" and "The Pear and Cherry Slug," to the Grimsby *Fruit-grower;* "The Codling Moth" to *Farm and Dairy;* "The Lesser Apple Worm" and "Yellow Disease of Asters" to the *Canadian Horticulturist;* the latter paper was also published by the *Canadian Florist;* "The Control of Blister Mites and the Codling Moth" to the *Farmer's Advocate.* In addition to these papers he has prepared in conjunction with the

Chemistry department Bulletin 177 on the Lime-sulphur Wash, which has been published. This bulletin furnishes an up-to-date account of the various Insect Pests and Fungus Diseases that may be controlled by the application of the wash, together with full information for the treatment of each, and many illustrations from original photographs.

FALL FAIRS, MEETINGS, ETC.

During the farmers' excursions to the College in the month of June, Mr. Jarvis took charge of the bureau of information and replied to numberless questions regarding injurious insects, weeds, etc., specimens of a large number being laid out for inspection.

At the request of the Superintendent, Mr. Jarvis visited the Mimico Asylum in order to investigate the unsatisfactory condition of many of the ornamental shade and fruit trees on the premises. He found that some failures in growth were caused by the character of the soil, and in many instances injury could be traced to the attacks of insect pests.

He also visited the estate of Dr. Robinson at Inglewood, County of Peel, in order to inspect the apple orchard and give information regarding its cultivation and treatment for insect and fungus injuries.

As in former years, exhibits of the most important injurious insects, fungus diseases, noxious weeds and weed seeds were sent to the following fall fairs: Lindsay, Picton, Simcoe, St. Catharines, Morrisburg, Winchester, Peterborough, Galt, Richmond, Carp, Roblin's Mills and Norwood.

Mr. Caesar, who took charge of the exhibits, supplemented the collection in some instances by gathering specimens from the neighboring orchards and fields of insect injury, fungus disease and weeds. He thus interested to a much greater extent the people of the neighbourhood and took the opportunity of impressing upon them the necessity of adopting the best methods of controlling these pests. A large exhibit was also made at the Toronto National Exhibition in connection with other departments of the College.

The Entomological Society of Ontario held its 46th annual meeting here on November 4 and 5, under the presidency of Mr. Jarvis. The usual popular lecture was given in Massey Hall by Dr. C. Gordon Hewitt, the successor as Dominion Entomologist of the late Dr. James Fletcher. His subject was "House Flies and Their Allies," illustrated with very beautiful and scientifically accurate lantern pictures. It is a great satisfaction to the members of the Society and others interested in the subject that a man so thoroughly well qualified by education, experience and training has been appointed to fill this important position in connection with the Experimental Farms of the Dominion.

At the annual meeting on November 8th of the Guelph Horticultural Society, your Professor of Entomology was elected President. This department will thus be brought into closer touch with the various works of the Society and the enthusiastic lovers of flowers who are keenly desirous of rendering the city of Guelph an attractive and beautiful place to live in.

CORRESPONDENCE.

INJURIOUS INSECTS AND REMEDIES. The number of letters received by the staff of this department from farmers and fruit growers and from the general public has greatly increased during the past year; enquiries respecting insect pests and fungus diseases of plants have come in almost daily and have been at once replied to. During the greater part of the season the most numerous complaints were made respecting Aphids, which this year seemed to attack almost every cultivated plant. Serious outbreaks were reported on Apple, Plum, and Cherry trees, Currant bushes, Elm, Basswood, Birch, Maple, Copper-Beech, Hawthorn, Privet, Fir and Spruce, Roses, Asters, Ferns, Cabbage, Turnips, Lettuce, Potatoes, Peas, Wheat, etc. In many cases the "honey-dew" falling from the colonies of aphis on large trees caused all the lower leaves to shine as if varnished, and attracted swarms of flies and other insects. Lady-bird beetles and their larvae, which feed upon Aphids, were unusually abundant also and helped to a large extent to reduce the numbers of the pests.

Next to the Aphids, Wireworms and White Grubs were most frequently complained of. For these underground root feeders little can be done as a direct remedy, but their breeding places in old pastures and grass fields should be broken up and the insects prevented from developing by a short rotation of crops. Deep plowing of affected areas late in the fall and again in early spring will break up their winter quarters and expose them to the weather and their various enemies. Hogs will turn up and devour them greedily and should be allowed to root up any field where the grubs are abundant.

Grasshoppers, which also breed in old pastures, especially where the soil is dry and sandy, were very abundant this year and did a great deal of damage to oats and other crops. In the Bruce Peninsula and the country around the Georgian Bay, they were extremely destructive. Rocky land, which cannot well be plowed, served as a convenient breeding place, and dry, hot weather favored the increase of the grasshoppers. Tree-planting in such places, where crops cannot be grown, would in the course of time become a permanent remedy.

Many enquiries were made regarding scale insects; the Oyster-shell and the San Jose attracted most attention. A new centre for the latter has been discovered in Prince Edward County; prompt measures should be taken for its extermination. In the Niagara fruit district spraying with the lime-sulphur wash has become very general and orchardists have learnt its value, but in the southwestern part of the Province much carelessness prevails and this most pernicious scale is allowed to increase and spread without much attempt to check it. A few years of this neglect will work widespread destruction amongst the fruit trees of that part of the country and the plague will soon extend to the counties contiguous.

The Elm-tree Scale (*Gossyparia spuria*) which was reported from Toronto last year, has this year been found widely distributed and very abundant in the northern part of the city. The Cottony Maple scale has also made its appearance in Toronto, and been reported from Fonthill and Welland and several other localities. It is to a large extent a town insect, infesting shade trees lining streets, and usually increases in numbers for several years till it becomes a veritable nuisance and then rapidly disappears, owing its destruction to its parasitic enemies, atmospheric effects and other causes. The Terrapin scale has again been sent in from St. Catharines and also from Chatham. The Scurfy scale and a Lecanium on grape vines are the only others to which our attention has been drawn.

Information is constantly asked for respecting the Buffalo Carpet Beetle and how it may be got rid of. Various other domestic insects such as Bed Bugs, Fleas and Cockroaches, have caused much annoyance in several places. In the Cobalt region and all through Northern Ontario, Black Flies are an intolerable nuisance; the larvae live in swiftly running rivers, attached to rocks over which the water is dashing, and consequently it seems impossible to do anything to interfere with their breeding and multiplication.

The Corn-ear Worm (*Heliothis armiger*) was found by a market gardener on the outskirts of Toronto, in some ears of green corn imported from Florida, and caused him much alarm, as he feared that a new kind of injurious insect was likely to be established amongst us. It has, however, been known for years as an occasional trouble in Ontario, not only spoiling ears of corn, but also boring into green tomatoes and devouring the foliage of tobacco plants. It is essentially a southern insect and is best known as the Cotton Boll-worm; there is no likelihood of its becoming a serious plague in this country. As in so many other cases clean cultivation and the burning up in autumn of all refuse from the corn and tomato plants is the best method of preventing the increase and spread of the insect. If this is not attended to, a safe refuge is afforded during the winter months for a variety of pests which hibernate wherever shelter of this kind is provided for them.

The Carrot Rust-fly (*Psila rosae*) has only recently been found in Ontario, having gradually spread to us from the Maritime Provinces where it has become a somewhat troublesome pest. It is a European insect accidentally imported about five and twenty years ago. The maggots of this fly destroy the roots of carrots, parsnips, and celery after they have been stored for the winter, and another brood burrows into the roots of the young plants in early summer, causing rusty blotches to appear and a rot to set in. The first indication of the attack is the change of the young foliage from green to reddish, denoting the sickly condition of the plant. Where this insect is found, late sowing seems to be the best remedy.

Insects affecting fruit trees are being reported upon by Mr. Jarvis and Mr. Caesar, and need not therefore be referred to here.

A great deal of correspondence was carried on by Mr. Jarvis in the Zoological department on the identification of birds and the preservation of bird skins. There were also numerous questions asked and enquiries made respecting lung-worms, tapeworms, hair snakes, trichina, round worms of man and mammals, malaria fever protozoan, slugs, sow-bugs, millipedes, fish, frogs, snakes, turtles, mice, moles, etc.

EXPERIMENTS CONDUCTED BY MR. JARVIS.

CONTROL OF THE CODLING MOTH. It has been found by experiments made during the spring and summer months of the present year on the Jarvis Fruit Farm in the Grimsby district that spraying with a solution of arsenate of lead as here directed is most effective to destroy the Codling Moth.

The arsenate of lead used was what is commonly known as the Vanco brand manufactured by the Toronto Chemical Company. It is sold in hundredweight kegs to those who require large quantities. It is however also put up in smaller packages. The quantity used was 2 lbs. to each forty gallons of water. The liquid was first strained through a wire gauze strainer to reduce the particles and so prevent any clogging at the nozzle.

In order to render the solution effective it should be applied with considerable force at constant pressure so that the liquid may enter the inner calyx cup of the young fruit where the young larvae mostly begin their feeding. Hand sprayers therefore are not always recommended as most effective because the pressure is not sufficiently strong at their best, besides there is a varying of the pressure if produced by hand. In these experiments a Gould sprayer, manufactured at Seneca Falls, N.Y., was used. It gives a constant pressure of about 200 lbs., and can be manipulated with the greatest ease and safety.

The experiments were carried on in three orchards; one of six acres of Greenings, one of ten acres of Baldwins, and one of two acres of mixed varieties. The first two received sprayings but not the last. The first spraying was done to the trees of the first two orchards with a Bordeaux nozzle, commencing June 4th, the time when the young fruit is just forming and the inner calyx cup can be easily reached, the spraying being principally aimed at the blossoms. The second spraying was done in the six-acre orchard about the 25th day of June last with a Friend nozzle, which gives a mist spray, the spraying being aimed at both the leaves and blossoms.

The result was that the six-acre orchard produced fruit being about 99 per cent. free from worms, the ten-acre orchard, sprayed once, produced fruit being about 70 per cent. free from worms, and the two acres unsprayed produced fruit being about 20 per cent. free from worms.

To make the experiment more varied a row of trees between the six-acre and ten-acre orchards was left unsprayed. The fruit on this row showed only 20 per cent. free from worms. It was further noticed that the sprayed row of Greenings a few yards away was almost free from worms.

Control of the Potato Beetle. For the purpose of finding out the strengths of arsenate of lead and of Paris green necessary for the destruction of the potato beetle, experiments were made by Mr. Jarvis upon eight plots, each containing two hundred potato plants. The plants were full grown and badly infested. Before spraying one plant was selected out of each plot and the larvae on it were counted. A hand sprayer was used and the spraying was done on the 19th day of July, 1909.

The subjoined table sets out clearly the results of these experiments and the relative effectiveness of arsenate of lead and of Paris green. It will be seen that either 3 lbs. of arsenate of lead to forty gallons of water, or ½ lb. of Paris green to a like quantity of water is sufficiently strong to kill the larvae and any larger quantity used is only wasted. The arsenate of lead used was the Vanco brand from the Toronto Chemical Company.

Kind of Arsenical used.	Quantity used per 40 gals. of water.	No. of larvæ on marked plant.	Larvæ destroyed at end of 24 hours.	Larvæ dead at end of 48 hours.
Arsenate of lead..............	1 lb.	20	1	3
" "	2 lbs.	21	5	18
" "	3 "	27	17	27
" "	4 "	11	4	11
Paris green..................	4 ozs.	19	3	14
" "	8 "	14	7	14
" "	12 "	13	8	13
" "	16 "	12	7	12

Experiments Conducted by Mr. Caesar.

Cockroaches or Croton Bugs (*Ectobia germanica*). For some years in spite of sporadic efforts to control them, the Croton Bugs had been increasing in certain parts of the College residence. In December, 1908, Mr. Caesar was requested by the President to take the matter in hand. After preliminary tests with one of the commonly recommended remedies, a trial was made of Peterman's Roach Food. The results were so good that no other remedies were tested. Roach Food is a powder containing a considerable amount of phosphorus along with other substances.

It is put up in small tin cases, each of which is supplied with a perforated top for dusting the powder through. Before applying it the rooms should be carefully swept and cleaned; the powder should then be dusted liberally around the walls and in dark, moist places where the roaches most abound. It should be left here for five or six days before sweeping up, after which a second application should be made and this again left as long as the patience of the housekeeper will permit. The powder does not lose its value through exposure to the air in this way, and seems to be just as attractive at the end of a week as on the first day. Two thorough applications were found sufficient to destroy almost all the insects in the room treated.

Usually one hesitates about recommending a patent remedy, but this is so easy to apply and has given such satisfactory results that it deserves our commendation. Two applications to seven fair-sized rooms cost about four dollars.

LEAF BLISTER MITE (*Eriophyes pyri*). As there are many farmers who do not know this insect a brief description of it seems desirable.

The Blister Mite is a very tiny, whitish creature, so small that a single individual is not visible to the naked eye. It attacks the leaves of the pear and apple throughout the season and causes numerous little blisters or swellings here and there over the surface. These are most conspicuous on the underside of the leaf. They gradually become reddish brown in color on apple leaves, and almost black on pear, and are thus visible for some distance on badly infested trees. The mites desert the leaves in fall and pass the winter under the bud scales. It is only while here that they can be successfully treated.

As no badly infested trees were found near the College, two pear trees of about 14 years of age near Mono Road that had last season been observed to be very badly attacked, were selected for the experiment. On May 11th the trees were sprayed with commercial lime-sulphur of the strength of 1 to 9. As the day was very calm both sides were sprayed at the same time.

In July and again on August 26th, the trees were examined, but no blisters could be found on any of the leaves. As the bud scales had been closely observed just before the spraying and numerous mites were found under them, and as the apple trees about 10 rods away were much worse attacked this year than last, it was quite evident that the lime-sulphur had been very successful.

Mr. J. H. Hare, B.S.A., agricultural representative at Whitby, co-operated with Mr. Caesar in this experiment, and found that the home-boiled lime-sulphur gave good results against the mites on apple trees. He also tested kerosene emulsion, but reports that this did not give so good results as the lime-sulphur.

CODLING MOTH (*Carpocapsa pomonella*). For some years many of the apple growers of the Niagara district have had such poor results from their efforts to control the Codling Moth by spraying that they have formed the opinion that the pest cannot be controlled in this way. Having learned of this state of affairs, Mr. Caesar decided to select an orchard of 5 or 10 acres in that district this spring and make a thorough test of spraying. While searching for such an orchard he, along with Mr. Crow, of the Horticultural department, was requested by Mr. P. W. Hodgetts, of the Horticultural Branch of the Ontario Department of Agriculture, to spray Mr. Joseph Tweddle's orchard at Stoney Creek. Mr. Crow was unable to take part in the work, so Mr. Caesar took it alone. The orchard contained 25 acres, and the trees average about 30 years of age, although many of those at the northern end were 50 years old and very high, never apparently having been headed back.

Two Friend spray machines were used with double-acting pumps, and with tanks each holding a little more than 160 gallons. Each spray waggon was also equipped with a tower about eight feet high. The man on the tower did all the spraying in each case. He used an eight-foot extension rod and two Friend nozzles attached to a V, the hole in each nozzle being considerably larger than usual. The object of this was to secure a coarse strong spray which could be driven forcibly into the calyx cavities of every blossom. Between the V and the extension rod a small brass elbow with an angle of about 45 degrees was inserted. The object of this elbow was to enable the sprayer to control the direction of the spray so that he could force it straight into the blossom end of the tiny fruit and thus cover every portion of the cavities at that part. Without the elbow this is scarcely possible. The elbow can be obtained from the Spramotor Co., London, for 20 cents. Two men worked each pump and an effort was made to maintain a pressure of at least 140 pounds.

The first spraying was begun June 5th, at which date nearly all the blossoms were off the Astrachan trees and other early varieties and most of them were ready to fall from the later varieties. For this spray arsenate of lead alone, 2 lbs. to 40 gals. of water, was used. To make sure that every blossom end was thoroughly covered with the poison it was found necessary to drench the trees. From 8 to 16 gallons were used on each of the larger trees. The first side was finished June 7th. As the wind failed to change, the other side had to wait until June 10th. This side was finished June 12th, but on account of the enforced delay a considerable number of the calyces had closed, especially in the upper end of the orchard, before the spraying could be finished.

It was thought wise to spray the orchard a second time for the Codling Moth. The date this time was determined by looking for the eggs and observing when they began to hatch in considerable numbers. This was found to be the case about three weeks after the beginning of the first application, that is, June 24th. Next day, June 25th, the spraying was begun; both sides were finished by June 29th. For this application Friend nozzles and the elbow were again used but new plates with holes only half the size used in the former application were placed in the nozzles. A pressure of about 160 lbs. was maintained throughout. As the object of this spraying was simply to cover every leaf and fruit thoroughly and not to drive the spray into the calyx cavity, only about half the amount of material was found necessary, that is, from 4 to 8 gallons to the larger trees, compared with 8 to 16 in the previous application. The mixture used this time was self-boiled lime-sulphur: 10 lbs. lime and 10 lbs. sulphur, boiling water being used to slake the lime, and the mixture then being diluted to 40 gallons of water; to this amount, 2 lbs. arsenate of lead was added. The lime-sulphur was used simply to control the Apple Scab; a previous application of this had been given but has not been referred to, as it did not have any bearing on the Codling Moth. The spraying with arsenate of lead between June 4 and 12 was to put the poison into the calyx cup so thoroughly that whenever a worm entered the fruit at this point at any time throughout the season the poison would be there and would kill it. The second spraying, June 25 to 29, was intended to kill the tiny worms that tried to enter the apple from the side or at any other place than the calyx end, and also any that might feed to some extent on the leaves before reaching the fruit.

Mr. Caesar did the spraying himself on one tower and Mr. Tweddle on the other, both doing the work in the same way.

On July 28 and 29, when the first brood had nearly all entered the fruit and some of the larvae of this brood had already emerged from the fruit and were to be found under the bands, the orchard was examined. Several neighboring unsprayed orchards were also examined at the same time, and it was discovered that 66 per cent. of this brood in these unsprayed orchards had entered the calyx end. In the sprayed orchard 15 trees of several varieties in the lower half were examined before any worms were found to have entered the calyx end. In the upper half, where a number of the calyces had closed before the spraying could be finished, a small percentage had done so. In the lower end at least 99 per cent. of the apples were free from worms, in the upper, 95 per cent. A considerable number of worms that had begun to enter from the side of the apple had died before getting any distance.

At this date, July 28 and 29, the Red Astrachan apples were beginning to ripen and a fair price having been offered for these at a nearby canning factory, the men were shaking the ripest off the trees. These and any already on the ground would naturally be the wormiest apples. As soon as they were shaken off Mr. Caesar examined the fruit under each of nine of these trees in the centre of the orchard. 100 apples were counted under each side of the tree, every apple, no matter when it had fallen, being counted. The results were as follows:

Tree No. 1, 97 per cent. clean; No. 2, 90 per cent.; No. 3, 94 per cent.; No. 4, 92½ per cent.; No. 5, 95½ per cent.; No. 6, 95½ per cent.; No. 7, 93 per cent.; No. 8, 96 per cent.; No. 9, 99 per cent.

On September 13th the trees were again examined. An examination of the bands on unsprayed orchards showed that the second brood had ceased to emerge. This examination showed considerable increase of wormy apples. A careful estimate of the condition of the fruit at each end of the orchard showed that apparently 90 per cent. of the apples were free from worms in the lower end and from 75 to 80 per cent. in the upper end. It should have been mentioned that the trees at this end were very large, and this in addition to a considerable number of the calyces having closed before the first spraying could be finished probably accounts for the greater percentage of wormy apples found here.

Being unable to be present when the apples were being picked, Mr. Caesar asked Mr. Tweddle to keep account of the percentage of clean fruit. Early in November Mr. Tweddle reported that in the lower half of the orchard 96 per cent. of the apples on the packing tables were free from worms, and 88 per cent. in the upper half. This, however, does not take into account the percentage of wormy fruit on the ground. Neighboring unsprayed orchards had from 50 to 95 per cent. of wormy fruit, and this orchard itself last year had more than 50 per cent. The main result of the experiment is that Mr. Tweddle himself and all those who have examined the orchard are convinced that the Codling Moth can be kept under control by spraying thoroughly at the right time. Equally good, and in some cases better results have been obtained by two or three other fruitgrowers this year in other parts of the Niagara district. In addition to the spraying experiments Mr. Caesar devoted considerable attention throughout the season to studying the life-history of the Codling Moth. This study will be continued next season. Further experiments in Codling Moth control in badly infested districts will also be undertaken and it is hoped that by the end of the year we shall be in a position to embody the results of the experiments and study of the life-history in a practical and comprehensive bulletin.

OYSTER-SHELL SCALE (*Lepidosaphes ulmi*). Experiments conducted by Mr. Caesar in 1907 demonstrated that the home-boiled lime-sulphur wash, 20, 15, 40 formula, applied to the trees shortly before the leaf-buds burst was a good remedy for Oyster-shell Scale. Observations since that date and information obtained from various sources, especially during his institute work, have shown that this is still on the whole the most satisfactory treatment for this insect. A badly infested orchard is seldom or perhaps never freed from the scale in one season by this wash, but if it be applied in spring for two or three successive years the results are most satisfactory.

Tests last year and again this year with commercial lime-sulphur show that this form of the wash also destroys many of the insects, but it has not been quite so satisfactory as the home-boiled in the experiments.

Commercial lime-sulphur of the strength of 1 to 30 and also of 1 to 40 applied in June just after the eggs had hatched and the young insects had ceased to run destroyed a high percentage of them and should supplement the spring wash wherever it was felt to be necessary to do so. Of course kerosene emulsion at this time of the year, if the fruitgrowers would use it, would give as satisfactory results as any spray mixture, but for some reason they will not use it so readily as lime-sulphur, especially commercial lime-sulphur. Moreover, the latter has a strong fungicidal value that kerosene emulsion has not.

In many orchards, especially east of Toronto, caustic soda (Gillett's lye) has been used to combat Oyster-shell Scale. The strengths used have varied greatly, and as conflicting claims have been made about its merits, Mr. Caesar and Mr. J. H. Hare co-operated in testing this wash at various strengths. In each case the wash was applied early in April before the buds had begun to swell.

Different amounts of the substance were used, varying from 4 cans of Gillett's Lye up to 13 cans to 40 gallons of water. The results obtained by both experimenters showed that to be of any real value against the scale the wash had to be very strong. Mr. Caesar found that 13 cans, which contain approximately 10 lbs. of caustic soda, each can containing only about 12 ounces, was necessary to give fairly good success. At this strength about 85 per cent. of the eggs were destroyed. Mr. Hare did not test so high a strength as this, but found, like Mr. Caesar, that strengths up to 6 lbs. did but little good.

At a strength of 10 lbs. (13 cans) to 40 gallons of water, no injury was done to the trees. We do not, however, advise the use of caustic soda because it is much more expensive at the above strength than lime-sulphur and because it has not got the same value as a fungicide and insecticide as the latter; for instance, it failed to destroy the Blister Mite in tests made by Mr. Hare. If it is used it should be in the proportion of 10 to 11 lbs. to 40 gallons of water and must be applied early in spring while the buds are still dormant.

No tests were made of the value of this wash when lime was added to it. Doubtless from 20 to 40 lbs. of freshly slaked lime would help greatly to make the weaker strengths of value, lime itself being of considerable value against scale insects if the trees are well coated with it.

A summer application of 2 lbs. caustic soda to 40 gallons of water applied just after the insects had all hatched gave poor results, not nearly so good as commercial lime-sulphur.

APPLE SCAB (*Venturia inaequalis*) AND COMMERCIAL LIME-SULPHUR. In order to get definite knowledge of the value of commercial lime-sulphur as a means of controlling Apple Scab, Mr. Caesar chose a row of Snow apple trees about twenty years of age in the College orchard and sprayed these as follows with the Vanco brand of commercial lime-sulphur: 1st, just before the blossoms opened, strength 1 to 25; 2nd, just after blossoms had fallen, 1 to 40; 3rd, three weeks later, 1 to 40.

The second spraying had to be omitted on the east side, owing to Mr. Caesar's enforced absence on other experiments. The spraying was very thoroughly done in every case.

Results: The west side, which had received the three sprayings, gave fruit 99 per cent. free from Scab; east side, where the second very important spraying had to be omitted, 85 per cent. free from Scab. None of the fruit was russeted and the foliage was uninjured except by the first spraying at the strength of 1 to 25, which burned the leaves a little around the tip.

This experiment, along with the results obtained by several fruitgrowers this season, shows that Apple Scab can be controlled by commercial lime-sulphur in the same way as by Bordeaux mixture. Lack of time alone prevented Mr. Caesar from making comparative experiments with Bordeaux mixture.

PEAR SCAB (*Venturia pirina*) AND COMMERCIAL LIME-SULPHUR. Commercial lime-sulphur was also used in experiments for the control of Pear Scab on Flemish Beauty trees. The trees were sprayed as follows: 1st, just before the buds began to burst, strength 1 to 9; 2nd, just after the buds had burst, but before the blossoms had quite appeared, strength 1 to 25; 3rd, just after the blossoms had fallen, strength 1 to 40; 4th, nearly 3 weeks later, strength 1 to 40.

In all of these applications the work was thoroughly done.

Results: On both sides of the trees the fruit and leaves were absolutely free from Scab, whereas all surrounding trees had a considerable amount of it on both fruit and leaves. These trees had received three applications of Bordeaux but had not received the early one before the buds burst, which seems to be a very important application. Once more the strength of 1 to 25 was found to burn the leaves slightly but they were quite uninjured at 1 to 40.

The experiments showed very clearly that it is quite possible to control Pear Scab even on Flemish Beauty trees with lime-sulphur.

BLACK ROT CANKER (*Sphaeropsis malorum*). **Mr. Caesar made a trip to** Whitby early in spring to perform some experiments on the value of cutting out, disinfecting and painting Black Rot Cankers on the trunks and large branches of apple trees. Owing to the absence of the owner of the selected orchard he was unable to do the work himself but explained to Mr. J. H. Hare the method he would adopt, and the latter kindly did the work for him a few days later. Since that date members of the College staff and Mr. Hare have visited the orchard and report excellent results, the diseased areas having been completely removed and the trees having made splendid growth. Similar results have been obtained by fruitgrowers in Prince Edward County. Mr. F. Dempsey and others from that county report that when the cutting out of cankers is supplemented by spraying the orchard in spring before the buds burst, with home-boiled lime-sulphur, followed by two or three later sprayings with Bordeaux, at the same dates as for Apple Scab, no new infections have taken place. Commercial lime-sulphur may be used in place of Bordeaux if desired.

Results: The results of the work done in various places seem to show that this dread disease can be very successfully controlled by the following method:

(1) Thoroughly prune the orchard early in spring, cutting out all dead branches and burning these lest they spread the disease.

(2) Cut out wherever possible cankers found on the trunk or main branches, taking special pains to see that all the diseased bark is removed. A draw-knife is handy for this purpose. Then disinfect the wounds with corrosive sublimate of the strength of 1 to 1,000, and paint carefully with white lead free from turpentine.

Caution: Corrosive sublimate is deadly poison if taken internally. It should not be used in tin or iron vessels, as it corrodes them, but only in wooden or glass vessels. These must be carefully washed afterwards.

(3) Spray all apple and pear trees at least three times: 1st, in spring before the buds burst, using home-boiled lime-sulphur or Bordeaux; 2nd, just before the blossoms open; 3rd, just after the blossoms have all or nearly all fallen.

For the second and third sprayings either Bordeaux mixture or commercial lime-sulphur may be used and special pains must be taken to see that the bark of the trunk and main branches is thoroughly covered, because in spraying it is often only the foliage and fruit that get attention, the bark being overlooked.

When time permits a fourth application with the same mixture two or three weeks after the third will be found helpful.

Early in the season, at the request of Mr. Caesar, Mr. Alfred Eastham was appointed by the Department of Agriculture to make a special laboratory and field study of the fungus that caused the Black Rot Canker. Unfortunately Mr. Eastham was able to devote only about two months to this work when he was forced to resign in order to prepare himself for his present position on the Botanical staff of the College. His report will soon be ready for publication.

Gum Diseases of Peach Trees. Further study of the gumming of peach trees that was very common last year and to a much more limited extent this year, shows that the experiments conducted last year were not carried sufficiently far and that, while inoculations of the trunk and branches with the spores of Brown Rot (*Sclerotinia fructigena*) produced typical gum exudations, this cannot be considered the cause of the gumming as a whole. The wood around many freshly formed gum masses was carefully cut out and cultures made from the diseased part, but in most cases no organism could be found present; in other cases where an organism did grow in any of the media, inoculations with it failed to produce the gum exudations. Up to the present, therefore, we have no proof that gumming is due to an organism.

The Museum.

The Biological portion of the Museum has been increased by the purchase of colored casts, natural size, of eight varieties of fishes, reptiles and frogs; enlarged anatomical models of a Star-fish, Clam, Crayfish, Frog, Perch and Leech; mounted skeletons of a Cat, Pigeon, Snake, Turtle, Frog and Perch; specially preserved dissections of a Sea Anemone, Star-fish, Sea Urchin, River Mussel, Sea Cucumber, Crayfish, Squid and Frog; a teaching collection of twenty-nine models and dissections of typical forms of invertebrate animals; and thirty mounted specimens representing the principal divisions of the invertebrata and a few of the smaller vertebrates. The whole collection is not only of much interest to visitors to the Museum, but is also most useful in illustration of the lectures in Zoology, especially to those taking the higher course in the Biological Option.

During the summer months a student was employed in collecting specimens of insects, etc., for class-room work and in attending to the breeding experiments in the Insectory.

Apparatus.

During the past year the equipment of this department has been increased by the purchase of the following articles: A hand Microtome; five Continental Microscopes (seven were procured during the preceding year); one Binocular Microscope; some high-power objectives; a large laboratory Incubator; several dozen Riker mounts for lecture and exhibition purposes; a set of thirty hand-painted diagrams of insects by Dr. Fyles; and about 80 of the Slingerland lantern slides.

Respectfully submitted,

CHARLES J. S. BETHUNE.

PART IV.

THE PROFESSOR OF BOTANY.

To the President of the Ontario Agricultural College:

Sir,—I beg to submit the third annual report on the work of the Botanical department.

There has been one change in the personnel of the staff. In July, Mr. J. W. Eastham entered on a year's special course at Cornell University, Ithaca, N.Y., in the department of Plant Pathology, on leave of absence. His place is taken by Mr. A. Eastham, B.S.A., of the class of '09. Investigation on the Black Rot Canker was carried on by Mr. A. Eastham during the season, and his report is included herewith.

During the year several new miscroscopes were added to our equipment. With the large increase in the number of students in the Junior Year the supply, however, is still inadequate. We plan to continue to make additions from year to year as available funds warrant. Purchase was also made of a number of botanical charts and models needed in the work of teaching.

Owing to the increased interest in the detection of the seeds of noxious weeds, we prepared a special weed seed collection for selling at cost to farmers and merchants. These are described more fully elsewhere. There has been a very lively demand for them.

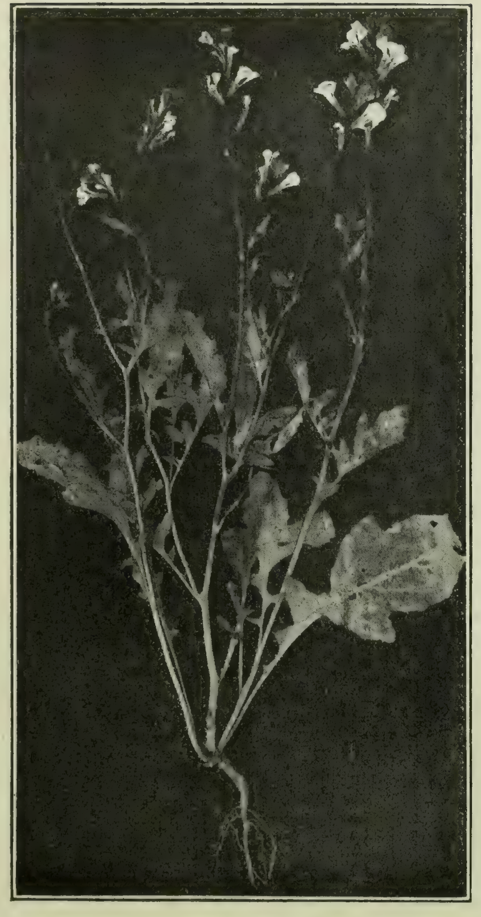
Owing to the development of work in the Nature Study Department consequent on the establishment of Teachers' Normal Classes, the organization of a Schools' Division of the Experimental Union and the commencement of a Schools' and Teachers' publication through the medium of the O.A.C. Review, I have found it necessary since the spring to leave the work of this department more and more in the hands of Mr. J. E. Howitt. I take pleasure in stating that he has met his increased work and responsibilities cheerfully and successfully. He has had charge of the special correspondence regarding weeds and weed seeds and also of some experimental work dealing with the treatment of weeds by spraying.

The remainder of the report dealing with these matters is prepared by him.

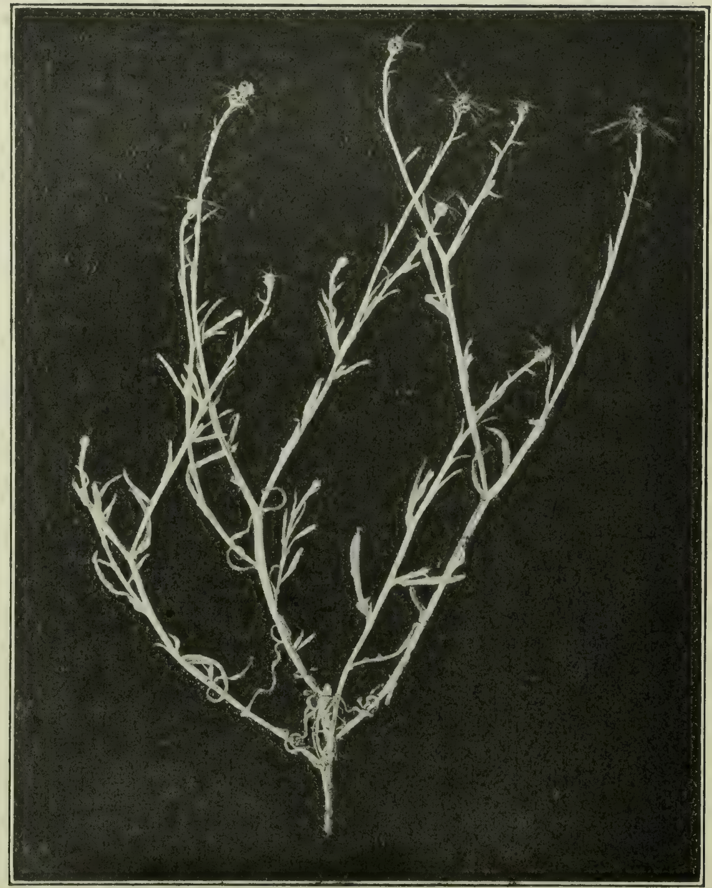
CORRESPONDENCE.

During the past season of 1908-1909 the number of letters received concerning weeds, weed seeds, and fungus diseases has been twice that of any one of the previous three years. The most marked increase is noticed in the number of samples of alfalfa, clover and timothy seed sent to the department to be tested for purity. This increased interest on the part of the farmers in pure seed is without doubt the result of the Weed Seed Control Act of 1905, which has been slowly instructing the farmers in the matter of pure seed and to the fact that pure seed is their right by law.

Judging by an analysis of the correspondence received during the past twelve months the following have been the most troublesome weeds for the season of 1908-1909: Perennial Sow Thistle (*Sonchus arvensis*); Dodder (*Cuscuta sp.*); Field Bindweed (*Convolvulus arvensis*); Field Mustard (*Brassica arvensis*); Wild Vetch or Wild Tare (*Vicia cracca*); Bladder Campion (*Silene latifolia*); Ground Cherry (*Physalis viscosa*); Stinkweed or Penny Cress (*Thlaspi arvense*);



Roquette, a new mustard in Ontario.



Barnaby's Thistle (*Centaurea solstitialis L.*).

Quack Grass (*Agropyron repens*); Wormseed Mustard (*Erysimum cheiranthoides*); Ox-eye Daisy (*Chrysanthemum leucanthemum*); Wild Oats (*Avena fatua*); Ragweed (*Ambrosia artemisiaefolia*); Horsetail or Scouring Rush (*Equisetum arvense*).

The Perennial Sow Thistle is still on the increase in Ontario, and many farmers are quite discouraged by it, claiming that it is impossible to eradicate it. It can, however, be eradicated by proper and thorough cultivation at the right season of the year, combined with the use of a well cared for hoed crop or smother crop. Many farmers report that they have been able to clean their fields of this pest by thorough after-harvest cultivation followed the next season by a bare summer fallow until it was time to sow fall wheat. Such a method is of necessity only effective when the fallow is thoroughly and repeatedly cultivated throughout the entire season so that the "roots" are broken up, the tops kept down, and the pest thus starved out. The discouraging thing about attempting to eradicate this pest is the fact that the seeds are blown about so freely by the wind that one neglected patch will reseed a whole neighbourhood and thus to a great extent spoil the results of a whole season's hard fight against the pest. Co-operation, therefore, is essential upon the part of all the farmers in a district in order to eradicate this weed.

RECENT INTRODUCTIONS.

ROCKET OR ROQUETTE (*Eruca sativa*). This weed which has been mentioned and described in our last two annual reports, continues to be reported from various parts of the Province as occurring in alfalfa fields. Its appearance in many cases has caused considerable alarm as it is a strong grower and a free seeder. Mr. G. H. Clark, in the last edition of "Farm Weeds of Canada," states that it is seldom considered a noxious weed in Europe, where it is frequently grown as a pot herb. This assurance, however, should not cause farmers in Ontario to be neglectful of it as many weeds which are not considered noxious in Europe are serious pests in Canada. A close watch, therefore, should be kept for it and all specimens which make their appearance should be pulled before they go to seed.

BARNABY'S THISTLE (*Centaurea solstitialis, L.*). This plant was reported last year as a weed in alfalfa fields, and during the past season has been sent in from several different parts of Ontario. A full description is given of it in our last annual report. It is easily recognized by the long, conspicuous yellow spines which surround the flower head. It is a conspicuous annual plant, and therefore not likely to become a serious pest.

BUR GRASS, SANDBUR OR HEDGEHOG GRASS (*Cenchrus tribuloides, L.*). This grass has been reported several times during the past season as growing as a weed in Ontario. Correspondents claim that on account of its spiny nature it is a very disagreeable and difficult weed to deal with. It is a low spreading annual grass found chiefly in sandy places. It is easily recognized by the peculiar spike composed of from 8 to 20 spherical prickly heads or burs which detach easily and adhere to clothing.

FORKED CATCHFLY (*Silene dichotoma,* Ehrh). This plant was reported for the first time this year as a weed in cultivated fields in Ontario. It resembles Night-flowering Catchfly somewhat, but the plant is not so large and robust; the inflorescence is forked and the flowers much smaller. This plant, being an annual, is not likely to become a bad weed.

GUMWEED OR GUM PLANT (*Grindelia squarrosa,* (Purch) Dumah). This plant was sent in for identification several times this past summer from different parts of Ontario. It is a coarse biennial weed with golden yellow flowers. The buds and flower heads are covered with gummy resinous secretion from which the plant gets the common name, Gum Plant. It is a common weed in the West but seldom troublesome in cultivated fields. It is supposed to cause hay fever.

German Knotgrass (*Scleranthus annuus,* L.). This is a plant to which the writer's attention was called while attending weed meetings this past summer in Simcoe and Waterloo Counties. Those who have had experience with it claim that it is very hard to eradicate. It is a low spreading annual plant with a stiff forking stem and narrow pointed leaves, often appearing to be in whorls. The flowers are borne in clusters in the axils of the leaves. They are inconspicuous, being without petals, small and greenish. A properly cared for hoed crop should rid a badly infested field of this pest.

Buffalo Bur (*Solanum rostratum,* Dunal). This is another weed which we believe to be practically new to Ontario. It was sent in by a correspondent for the first time this year. In the Southwestern States it is considered a very serious pest. It is a coarse growing, somewhat woody, hardy annual plant, with the branches and main stem covered with sharp yellow prickles. The leaves are cut and lobed; flower bright yellow, and about an inch across. The fruit is a berry which is enclosed by a close fitting and prickly calyx which has suggested the common name, Buffalo Bur.

Weed Seed Collections.

In order to aid farmers, seedsmen, and others to become acquainted with the common impurities of clover, grass, and other economic seeds, the Botanical Department has prepared seed cases containing the weeds covered by the Seed Control Act of 1905, together with ten other more common impurities of clover and grass seed, which farmers and seedsmen should know. On the back of these cases is printed a brief summary of the Seed Control Act of 1905, some general advice on buying clover and grass seed and on the control of weeds. These seed cases are furnished to all who desire them at cost price (25 cents), on application to the Botanical Department, Ontario Agricultural College. A considerable number of these cases have been sent out during the past year and a steady demand continues for them.

Plant Diseases.

No serious outbreaks of fungus diseases have occurred in the Province during the past year. Numerous enquiries, however, have been received concerning diseases of a more or less serious nature. Some of these were due to parasitic fungi, others to obscure physiological causes. Among the latter class may be mentioned a peculiar browning and shrivelling of the leaves of hard maples, noticed in some parts of Ontario. Leaves showing this peculiar disorder were sent to the department several times with enquiries as to cause and treatment. They were carefully examined but showed no trace of parasitic fungi. Amongst the diseases due to parasitic fungi upon which advice was given, the following may be mentioned: Peach Leaf Curl (*Exoascus deformans*); Late Blight of Potato (*Phytophthora infestans*); Mildew of Grass and Cereals (*Erysiphe graminis*); Leaf Spot of Beet (*Cercospora beticola*); Peach Mildew (*Sphaerotheca pannosa*); Strawberry Leaf Spot (*Mycosphaerella fragariae*) and Leaf Spot of Cabbage (*Macrosporium brassicae*). A number of fleshy fungi were also sent in for identification with enquiries as to whether they were edible or not.

Mr. Alfred Eastham spent the summer months investigating the Black Rot Canker in Ontario, and contributes the following synopsis of his investigations on this very important disease:

BLACK ROT CANKER (*Sphaeropsis malorum*, Peck.).

Attention was first called to the importance of this disease by Paddock in Bulletins 163 and 181 of the New York Geneva Station. The cause of the majority of apple tree cankers in that state was proved by this worker to be due to *Sphaeropsis malorum*, Peck., a fungus which was previously known to cause a somewhat unimportant disease of the fruit known as Black Rot. The Black Rot Canker was found by Paddock to be prevalent in New York State, in fact the disease frequently goes by the name of the New York Apple-tree Canker. But this disease is by no means confined to New York. In the United States it occurs from Alabama to the northern boundary and from New Hampshire and New York westward to Nebraska and Illinois. In Canada it is widespread both in Ontario and Quebec, being apparently, however, most severe in the colder and more exposed sections. Thus in Ontario we find it worst in the counties of Prince Edward, Ontario and Hastings, in fact east of Toronto generally. In the less exposed sections of the province, as for instance the Niagara district, the disease is of little consequence, though an infected tree may occasionally be found.

Although the fungus is known to attack pear, quince and certain other allied Rosaceous trees, yet, as far as the writer has observed, it is in Ontario confined entirely to the apple. There is, however, in certain sections of Ontario a common and destructive canker on the white poplar which is believed by many to be caused by the Black Rot fungus. This is, however, extremely improbable, as with the exception of a slight superficial resemblance the cankers are quite distinct in appearance. Although there are apparently no varieties of apples which are immune from this disease, yet certain ones are far more susceptible than others, and furthermore, the susceptibility of any particular variety seems to vary somewhat with the district. Generally speaking, however, the varieties which suffer most severely are the Ben Davis, Northern Spy, Stark, Ontario, Walbridge, Salome, Shannon, and King. Of the more resistant varieties we may mention Peewaukee, Cranberry, Pippin, McMahon White and Tolman Sweet.

The fungus may occur on any part of the tree, being found attacking the trunk, branches, leaves, fruit, and occasionally the twigs.

On the leaves it appears as a small purplish spot which ultimately attains a size of from 1-8 inch to 1-4 inch in diameter. The centre of the spot gradually becomes brownish or yellowish owing to the death of the leaf tissue, and we get finally a brownish spot surrounded by a purplish ring which is quite characteristic, and usually serves to distinguish this disease from the "spots" due to the attacks of other fungi.

On the fruit Black Rot has long been known. As a rule, however, the damage done is slight and practically negligible. The fungus apparently gains entrance by means of some injury and afterwards sets up a black rot which ultimately becomes dark in color and covered with small, black, pimple-like bodies or pycnidia which are filled with numerous spores. These spores are disseminated by the wind, and hence it is important to destroy all diseased fruit since it serves as a constant source of infection for the trunk and branches. It is on these latter portions that the disease is most severe, the fungus causing serious cankers, a phase of the disease which has caused much alarm in certain sections of Ontario. There is little doubt that the great majority of cankers found on apple trees throughout Ontario are caused by the Black Rot fungus. Careful examination of cankers from many part of the Province, together with inoculation work made both from diseased fruit and cankers, have shown conclusively that these cankers are undoubtedly due to this particular fungus.

The mature spores were found being disseminated from the cankers as early as the first week in April. At the same time large numbers of spores were found on rotten apples in the same orchards. The fungus gains entrance through some wound or injury, and by its growth gives rise to characteristic diseased areas, on which appears the small black pcynidia. From the writer's experiments and observations it would appear that these cankers do not usually produce spores the first season of growth; this, however, does not appear to be a constant feature. The cankers grow with considerable rapidity and the trunk or branch becomes girdled, death resulting to the entire tree or to the branch involved, as the case may be. Most of the cankers appear to be of comparatively recent growth, and furthermore, they are usually more severe on young trees. By many fruitgrowers the great freeze in 1903-4 is held repsonsible for much of the disease and there can be little doubt that many of the cankers, particularly in Prince Edward county, date back to that year.

As regards the control of this disease, there are several points of importance:

(1) Keeping the trees in a good healthy condition by means of good cultivation, etc. Orchards in sod are often very badly infected.

(2) Prevention of injury, particularly winter injury, *e.g.*, sunscald, which is responsible for a large percentage of the cankers on young trees. High-headed trees often suffer severely from sunscald and consequently canker.

(3) Carefully cutting out the cankers, disinfecting with corrosive sublimate, and painting with raw oil paint.

(4) Lastly, thorough spraying, paying particular attention to the trunks and branches, using lime-sulphur before the buds swell, and Bordeaux later on.

There can be little doubt that with good cultivation, thorough spraying and careful cutting out of all cankers, and thorough destruction of all diseased rubbish this disease can be controlled, a fact which has been demonstrated during the past year by numerous fruit growers east of Toronto.

EXPERIMENTAL WORK.

The time devoted to experimental work during the past year has been very limited owing to the increased academic duties due to very much larger regular classes and special spring and summer classes in Nature Study and Elementary Agriculture. Some experiments, however, have been carried on in spraying to kill weeds, destroying Bindweed and testing Clover and Alfalfa seed. The results of these experiments are herewith given.

SPRAYING EXPERIMENTS.

In our last annual report the results of the experiments in spraying Mustard and other weeds with iron sulphate were given. These results, so far as time permitted, have been further substantiated by more experiments along the same line and on a rather more extensive scale. A test was also made to compare the efficiency of iron sulphate (or copperas) with that of copper sulphate (or blue-stone) as a herbicide to destroy Wild Mustard. Without entering into the details of the methods and results of these experiments, which are very similar to those outlined in last year's report, which is available to those who are particularly interested, the conclusions drawn from the results of these two years' work are here given:

1. That iron sulphate, $FeSO_4$ (copperas), can be successfully used to destroy Mustard in standing cereal crops without injuring them.

2. That the best results are obtained by using a solution containing about 100 lbs. of iron sulphate to 50 gallons of water.

3. That to be most effective the solution should be applied just before the plants come into bloom.

4. That the spraying should be done on a bright, sunny day during a spell of fine weather. A heavy rain within 24 hours after spraying lessens very materially the herbicidal activity of the solution.

5. Solutions of iron sulphate are more effective in destroying Mustard than those of copper sulphate and are more easily prepared.

6. An ordinary hand pump may be used for this spraying or a potato power sprayer with the nozzles set closer together. A fine, steady spray is most effective.

7. A little whitening put in the solution makes it possible to see more readily how much of the field has been sprayed, and thus avoid missing strips here and there.

8. Field Bindweed, Sow Thistle, Canada Thistle, and the Plantains cannot be destroyed by spraying with iron sulphate as the perennial underground parts are not reached by the solution.

BINDWEED EXPERIMENTS.

An attempt was made to kill Bindweed by applying crystals of iron sulphate. On a thick patch of Bindweed, 3 yards long by 2 yards wide, 20 lbs. of the crystals of iron sulphate were placed. On a similar patch of the same size, 9 lbs. were applied. On inspecting the plots three days after the applications were made, it was found that on the plot on which only 9 lbs. of the iron sulphate had been applied the leaves were only slightly damaged, while on the plot on which 20 lbs. had been used all the leaves and stems were blackened and destroyed. Three weeks later, however, both plots looked as green and fresh as ever; even the heavy application having failed to weaken the underground root-stocks.

TAR PAPER EXPERIMENT.

A trial was made to smother out Bindweed by covering with tar paper. On June 1st a patch five yards long by three yards wide was covered with tar paper, and the ends and sides banked with earth and stones. The experiment was not a success, as the weed spread out around the ends and sides in spite of the heavy covering of earth and stones, and the tar paper wrinkled and tore in spots, allowing the weed to send out shoots to the sunlight. In the fall, though the patch was bleached and weakened, it was by no means destroyed. It is probable that two layers of the paper would be more effective, especially if the patch was closely watched and any shoots appearing around the edges destroyed.

Correspondents report that they have been able to smother out small patches of Bindweed by covering it with the fine grass raked off the lawn after mowing. The covering requires to be very heavy and well packed down and a little earth thrown on top. Straggling shoots, which will make their way up even through such a covering, must be pulled out if the treatment is to be thoroughly successful.

ALFALFA AND CLOVER SEED INVESTIGATIONS.

During the past two seasons a large number of samples of clover and alfalfa seeds were examined as to freedom from weed seeds, dirt, etc., with the following objects in view:

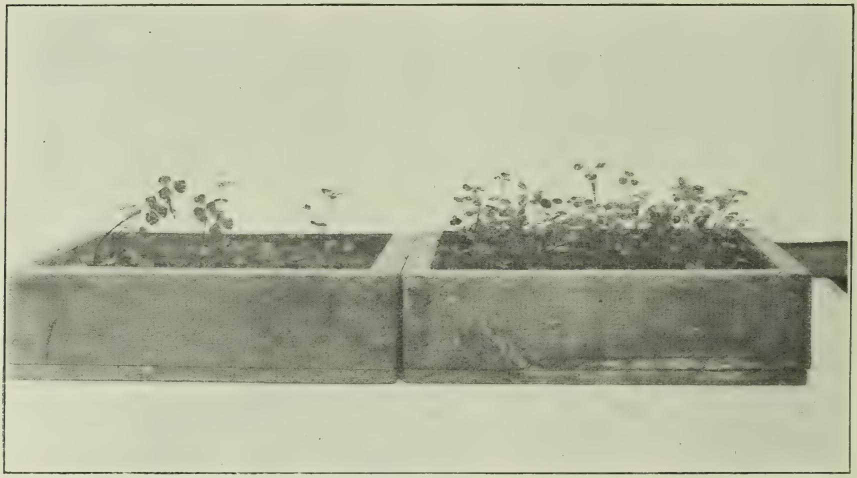
1. To determine as far as possible the condition of clover seed as sown in Ontario as regards the number and kind of weed seeds contained.

2. To ascertain the weed seeds that are most commonly found in the various kinds of clover seed.

3. To note the new weeds that are likely to be spread through the Province as impurities in clover seed.

4. To get some idea as to whether the germination capacity of a sample of clover seed can, to any extent, be determined by plumpness and brightness of the seeds in a sample.

5. To determine the loss caused by buying clover seed containing a large percentage of dirt and inert matter, such as is too often found in clover seed offered for sale.



Alfalfa plants grown from plump, bright seed (on the right) and from shrunken seed (on the left).

This work is still under way and the following is but a report of progress.

TESTS WITH ALFALFA SEED.

The experiment with alfalfa seed was conducted as follows: Ten samples of alfalfa seed, sent in by correspondents for test, were taken at random, and a hundred plump bright seeds, a hundred discolored plump seeds and a hundred shrunken seeds counted out from each sample and placed in Zurich germinators. These were kept in the greenhouse at a suitable temperature, and the seeds of each class of each sample removed and counted as they germinated. This experiment was duplicated by sowing a hundred seeds of each class from ten other samples in shallow pots. This was done as germination tests give but a relative idea of the number of plants that will grow, as some seeds contain enough vitality to germinate, but not enough to produce a plant. At the same time no accurate idea of the vigor of the plants that will be produced can be obtained from a germination test.

The following tables give the results of these two experiments:

GERMINATION TESTS WITH ALFALFA SEED.

No. of sample.	No. of bright, plump seeds that germinated.	No. of dull, plump seeds that germinated.	No. of shrunken seeds that germinated.
1	91	89	48
2	74	60	36
3	99	70	36
4	87	61	3
5	98	59	19
6	90	69	46
7	98	55	10
8	91	48	14
9	92	29	35
10	5	13	43
Totals............	825	553	290

SOWING TEST WITH ALFALFA SEED.

No of samples.	No. of plants produced by bright plump seeds.	No. of plants produced by dull plump seeds.	No. of plants produced by shrunken seeds.
1	69	36	22
2	40	25	28
3	74	66	11
4	66	34	38
5	61	41	32
6	50	23	15
7	97	53	20
8	82	39	34
9	77	26	30
10	96	26	33
Totals............	712	369	263

It will be seen at a glance at the table that out of the thousand plump bright seeds sown 825 germinated, making the average germination capacity of the bright plump seeds 82.5 per cent.; while out of the thousand discolored plump seeds only 553, or 55.3 per cent. germinated, a difference in favor of the bright plump seeds of 27.2 per cent. The difference is still more marked in the case of the shrunken seeds; only 290 out of the thousand, or 29 per cent,, germinated, making a difference in favor of the bright plump seeds of 53.5 per cent.

The table showing the results of planting the seeds and growing the plants shows still more marked results in favor of bright plump seeds. The thousand plump bright seeds sown produced 712 healthy, vigorous young plants; the thousand discolored plump seeds produced 369 plants, and the thousand shrunken seeds produced only 263 plants. Thus the bright plump samples produced on an average 34.3 per cent. more plants than the dull plump seeds, and 44.9 per cent. more plants than the shrunken seeds. It should also be added that there was a very noticeable difference in the vigor of the plants produced from the different samples. The plants from the bright plump seeds were in every case the healthiest and most vigorous.

These results have a practical bearing indicating very clearly the importance of looking over samples of alfalfa seed carefully before buying in order to secure a sample containing as small a percentage as possible of shrunken and discolored seeds. A careful observer will be very much impressed by the great variation in this respect of different lots of seeds, some containing a large quantity of shrunken and discolored seeds, others a very small percentage.

Red Clover Germination Test.

A similar experiment was conducted with Red Clover seed, but only bright plump seeds and dull plump seeds were tested. Out of two thousand bright plump seeds, one hundred from each of twenty samples, 1818 germinated, indicating an average germination capacity for the bright plump samples of 90.9 per cent. Out of the two thousand dull plump seeds selected, 1,702 germinated, indicating an average germinative capacity for the dull plump samples of 85.1 per cent. The average germinative capacity of the twenty bright plump samples was thus 5.8 higher than the average germinative capacity of the twenty dull plump samples. These results, though not so marked as with the alfalfa seed, again indicate the importance of selecting bright, well colored seed.

Purity of Alfalfa Seed.

Out of 147 samples of alfalfa seed submitted for test by farmers and seedsmen 15 were found to be absolutely free from weed seeds of any kind, 98 to be free from the weeds covered by the Seed Control Act, though containing other weed seeds in various amounts; 34 were found to contain sufficient weed seeds to disqualify them from being offered for sale in Ontario. Out of the 147 samples tested 7 were noticeably dark and discolored, indicating lack of germinative capacity; and 4 were found to contain very large quantities of grit and other inert matter.

The following weed seeds were found to be the most common impurities in alfalfa seed: Green Foxtail (*Setaria viridis*), present in 56 samples; Lamb's Quarters (*Chenopodium album*), present in 42 samples; Russian Thistle (*Salsola Kali*, var. *tenuifolia*), present in 35 samples; Buckhorn or Ribgrass (*Plantago lanceolata*), present in 32 samples; Curled Dock (*Rumex crispus*), present in 21 samples; Pigweed (*Amaranthus retroflexus*), present in 20 samples; Ragweed (*Ambrosia artemisaefolia*), present in 11 samples; Yellow Foxtail (*Setaria glauca*), present in 10 samples; Chicory (*Cichorium Intylbus*), Wild Carrot (*Daucus carota*), Bull Thistle (*Cirsium lanceolatum*) and (*Centaurea picris*) present in 9 samples.

Other weed seeds found in alfalfa were Black Medick (*Medicago lupulina*), Sweet Clover (*Melilotus alba*), Lady's Thumb (*Polygonum Persecaria*), Knot Grass (*Polygonum aviculare*), Sheep Sorrel (*Rumex Acetosella*), Dodder (*Cuscuta sp.*), Old Witch Grass (*Panicum capillare*), Mayweed (*Anthemis cotula*), Yellow Cress (*Radicula palustris*), Field Mustard (*Brassica arvensis*), Night-flowering Catchfly (*Silene noctiflora*); Scotch Thistle (*Onopordum acanthium*), Corn Flower (*Centaurea nigra*), Black Bindweed (*Polygonum Convolvulus*), Mint

(*Mentha* sp.), Water Hemlock (*Cicuta maculata*), Musk Thistle (*Carduus nutans*), Stick Seed (*Lappula echinata*), White Cockle (*Lycnhis alba*), Bedstraw (*Galium Aperine*), Canada Thistle (*Cirsium arvense*), Barnyard Grass (*Echinochloa crus-galli*), Cow Cress (*Lepidium campestre*), Corn Gromwell (*Lithospernum arvense*), Mallow (*Malva rotundifolia*).

PURITY OF ALSIKE SEED.

Out of 45 samples of alsike seed tested none were found to be absolutely free from weed seeds, 4 only were free from the weed seeds covered by the Seed Control Act, 41 contained weed seeds covered by the Act.

The following were found to be the most common impurities in alsike seed: Night-flowering Catchfly present in 37 samples, Curled Dock present in 17 samples, Sheep Sorrel present in 16 samples, Lamb's Quarters present in 11 samples, Green Foxtail present in 7 samples.

Other weed seeds found in alsike were: Bladder Campion, Bugle Weed (*Lycopus virginicus*), Rib-grass or Buckhorn, Rough Cinquefoil (*Potentilla monspeliensis*), Wormseed Mustard, False Flax, Chickweed (*Stellaria media*), Canada Thistle, Black Bindweed, Lady's Thumb, Black Medick, Common Plantain, Old Witch Grass, Pigweed, Ragweed, Yellow Cress, Yellow Foxtail, Evening Primrose, Pepper Grass (*Lepidium* sp.), Mayweed, Mouse-ear Chickweed (*Cerastium vulgatum*), Shepherd's Purse (*Capsella Bursa-pastoris*).

PURITY OF RED CLOVER SEED.

Out of 78 samples tested 1 was absolutely free from weed seeds; 21 were free from the weed seeds covered by the Seed Control Act; 56 contained weed seeds covered by the Seed Control Act; 5 samples contained large amounts of grit and other inert matter.

The following were found to be the most common impurities in red clover seed: Green Foxtail present in 50 samples, Buckhorn or Ribgrass present in 35 samples, Curled Dock present in 26 samples, Lady's Thumb present in 21, Ragweed in 20, Lamb's Quarters present in 17 samples, Pale Plantain (*Plantago Rugelii*), Night-flowering Catchfly, and Sheep Sorrel present in 12 samples.

Other weed seeds found in red clover were Mayweed, Wild Oats (*Avena fatua*), Black Medick, Canada Thistle, Yellow Foxtail, Common Plantain (*Plantago major*), Bladder Campion (*Silene latifolia*), Heal-all (*Prunella vulgaris*), Pigweed, False Flax (*Camelina sativa*), Bracted Plantain (*Plantago aristata*), Catnip (*Nepeta cataria*), Wormseed Mustard (*Erysimum cheiranthoides*), Stickseed, Evening Primrose (*Onagra biennis*), Old Witch Grass, Barnyard Grass, Cow Cress, Knot Grass, Black Bindweed, Wild Carrot, Wild Vetch (*Vicia cracca*), Dodder.

PURITY OF TIMOTHY SEED.

Out of 33 samples tested 3 were entirely free from weed seeds, 17 contained no weed seeds covered by the Seed Control Act, 13 contained weed seeds covered by the Act.

The following were the commonest impurities found in timothy seed: Pale Plantain present in 16 samples, Lamb's Quarters present in 11 samples, Evening

Primrose present in 8 samples, Ribgrass or Buckhorn present in 7 samples, Pepper Grass and Cone Flower (*Rudbeckia hirta*) present in 6 samples.

Other weed seeds found in timothy were: Mint, Ergot (*Claviceps purpurea*), Blue Vervain (*Verbena hastata*), Night-flowering Catchfly, Spiny Annual Sow Thistle, Old Witch Grass, Finger Grass (*Digitaria sanquinale*), Wormseed Mustard, Common Plantain, Rough Cinquefoil, Green Foxtail, Bugle Weed, Curled Dock, Mayweed, False Flax, Lady's Thumb, Sheep Sorrel, Catnip and Mouse-ear Chickweed.

OUTSIDE LECTURES.

The following is a list of the outside lectures and addresses delivered by the members of the Botanical staff during the past year:

"How Plants Grow," by Mr. J. W. Eastham, before the Horticultural Short Course Class in February; "The Perennial Sow Thistle and Other Noxious Weeds," by J. E. Howitt at Whitby on May 21st; "Noxious Weeds," by J. E. Howitt at the Annual Meeting of the West York Farmers' Institute at Weston, June 9th; "Weeds," by J. W. Eastham at Ayr on June 30th. Other meetings in the interest of pure seed and fewer weeds were addressed by Mr. Howitt at Branchton, New Hamburg and Crown Hill.

PUBLICATIONS.

Mr. Howitt has acted as Botanical Editor of the Ontario Natural Science Bulletin, and has contributed a number of short articles on "Weeds and Weed Seeds" to *Farm and Dairy, The Farmer's Advocate, The Canadian Horticulturist,* and the Annual Report of Farmers' Institutes in Ontario.

Mr. Eastham has contributed a number of articles on the control of fungus diseases to various publications.

HERBARIUM.

A large number of new specimens have been added, including a most interesting collection of Rocky Mountain plants contributed by Mr. N. H. Cowdry, Waterford, Ont., and a fairly representative collection of our common cultivated plants prepared by the members of the Botanical staff, the latter to serve as a reference collection for advanced students in Biology and Horticulture in naming the specimens in their own collections. A large number of permanent slides of the economic parasitic fungi have also been put up and added to the reference collections of parasitic fungi.

Respectfully submitted,

S. B. McCREADY.

PART V.

THE PROFESSOR OF PHYSICS.

To the President of the Ontario Agricultural College.

SIR,—I have the honour to submit herewith my fourth report as head of the department of Physics.

INSTRUCTION.

(*a*) *Lecture Courses.* In the first year the instruction in the department consists of courses in Arithmetic, Hydrostatics as a preparation for and followed by Soil Physics, and, lastly, a course in the principles of Mechanics. The work of the second year consists of Surveying, Drainage, and Farm Power and Farm Water Supply by electricity, wind and water. The third year make a specialty of Meteorology, Cold Storage, and Ventilation, based upon a thorough course in Heat. In the final year, Climatology, advanced Drainage, and advanced Soil Physics are emphasized.

(*b*) *Laboratory Work.* Laboratory practice is given all the years, in the various subjects.

WEATHER REPORT.

Tables I. and II. give a summary of the weather data at representative stations which this department has equipped with the necessary meteorological instruments

TABLE I.—WEATHER REPORT OF 1909.

Month.	Mean temperature.	†Departure from normal.	Highest temperature.	Lowest temperature.	Snowfall in inches.	Rainfall in inches.	*Precipitation in inches.	†Departure from normal.
O. A. C. Guelph—		[22 yrs.]						[22 yrs.]
January........ ...	23.2	+3.1	58.0	—12.0	4.25	1.77	2.20	+ .69
February..........	23.5	+4.4	48.0	— 7.0	2.00	1.07	1.27	— .32
March..............	26.6	— .3	41.0	7.0	7.75	.41	1.19	— .17
April...............	39.3	—1.9	66.0	12.0	3.00	3.30	3.60	+1.97
May........	50.6	— .6	80.0	29.0	1.06	3.32	3.43	+1.06
June	64 9	+1.6	93.0	38.0	....	1.33	1.33	—1.55
July................	68.2	+ 1	86.5	44.0	....	4.54	4.54	+1.50
August............	67.7	+1.4	93.0	41.0	....	.89	.89	—1.26
September.........	57.9	—2.0	94.0	31.0	....	.86	.86	—1.34
October	43.1	—3.1	75.0	23.0	....	.99	.99	—1.28
November	39.0	+4.7	65.0	11.0	....	6.42	6.42	+4.13
December..........	21.5	—2.2	43.0	— 9.0	2.80	.08	.36	—1.28
Year............	43.8	+ .4	94.0	—12.0	20.86	24.98	27.07	+1.43

TABLE I.—WEATHER REPORT OF 1909.—Continued.

Month.	Mean temperature.	†Departure from Normal.	Highest temperature.	Lowest temperature.	Snowfall in inches.	Rainfall in inches.	*Precipitation in inches.	†Departure from Normal.
Bay View, P. E. I.—		[3 yrs.]						[3 yrs.]
January	17.3	— .3	54.0	—11.0	20.8	1.14	3.22	+ .59
February	18.2	+2.0	49.0	—23.8	4.7	1.02	1.49	— .29
March	28.3	+3.3	46.0	— 5.0	32.0	.81	4.01	+1.56
April	33.1	+1.5	63.0	11.0	7.0	3.05	3.75	+ .37
May	44.9	+1.4	71.0	27.0	....	2.92	2.92	+ .25
June	58.1	+1.8	81.0	41.0	....	1.10	1.10	— .38
July	63.8	+ .8	83.5	43.0	....	3.10	3.10	— .85
August	65.7	+3.0	86.5	49.0	....	5.24	5.24	— .03
September	....	....	....	....	....	....	....	....
October	47.4	+0.0	65.0	28.0	....	4.14	4.14	+ .31
November	41.2	+3.8	68.0	20.0	.04	1.59	1.60	—1.36
December	24.7	— .2	46.0	2.0	5.00	2.63	3.13	—1.29
Year	....	....	86.5	23.08	69.54	....	....	....
Jordan Harbour. (Lincoln Co.)—		[2 yrs.]						[2 yrs.]
January	28.0	....	62.0	2.0	19.5	.63	2.58	....
February	26.9	....	53.0	5.5	7.88	1.01	1.80	....
March	30.2	—2.8	45.0	10.0	9.00	1.52	2.42	+ .81
April	41.1	— .4	70.0	17.0	.55	1.83	1.89	+ .24
May	52.1	— .3	73.0	31.0	....	2.49	2.49	+ .02
June	64.2	— .9	90.0	42.0	....	3.41	3.41	+ .50
July	69.2	— .8	90.0	50.0	....	1.94	1.94	—1.22
August	68.4	+ .2	94.0	44.0	....	2.72	2.72	+ .65
September	59.1	—1.7	92.0	41.0	....	2.70	2.70	+1.04
October	45.2	—1.6	79.0	25.0	....	3.77	3.77	+ .45
November	41.4	+ .9	69.0	24.0	....	2.64	2.64	+ .63
December	26.1	—1.9	45.0	4.0	....	1.60	1.60	+ .08
Year	46.0	....	94.0	2.0	36.93	26.26	29.96	....
Leamington, (Essex Co.)—		[3 yrs.]						[3 yrs.]
January	29.5	+2.4	57.0	— 3.0	3.00	.57	.87	—2.09
February	30.2	+6.4	47.0	18.0	....	....	....	....
March	31.2	—3.3	49.0	15.0	....	....	....	....
April	41.1	— .3	64.0	29.0	....	....	....	....
May	47.7	—3.7	70.0	28.0	....	....	....	....
June	....	....	....	....	....	....	....	....
July	71.4	— .5	90.0	51.0	....	....	....	....
August	70.8	+1.5	89.0	47.0	....	2.04	2.04	— .49
September	56.5	—5.0	95.0	37.0	....	1.91	1.91	— .41
October	46.7	—2.2	79.0	23.0	....	1.48	1.48	— .36
November	42.6	+2.6	64.0	19.0	....	4.60	4.60	+2.00
December	29.1	— .2	51.0	.4	10.5	.88	1.93	+ .38
Year	....	....	95.0	— 3.0	113.5	....	....	....

TABLE I.—WEATHER REPORT OF 1909.—Continued.

Month.	Mean temperature.	†Departure from Normal.	Highest temperature.	Lowest temperature.	Snowfall in inches.	Rainfall in inches.	*Precipitation in inches.	†Departure from Normal.
Magnetawan.		4 yrs.]						[4 yrs.]
(Parry Sound)—								
January....	14.6	+0.0	43.5	—24.0	8.2	1.90	2.72	— .53
February..........	12.7	+2.6	44.5	—19.5	25.7	1.97	4.54	+1.40
March.............	20.2	+ .4	40.0	—11.5	22.5	.62	2.87	+ .12
April..............	34.3	— .3	58.0	3.5	20.2	2.40	4.42	+1.11
May...............	48.0	+ .8	75.0	26.5	1.2	3.91	4.03	+2.69
June	60.0	— .6	82.0	32.5	....	.65	.65	—1.90
July...............	63.3	— .8	84.5	37.0	....	2.93	2.93	+1.40
August............	64 0	+1.4	88.5	28.5	....	2.15	2.15	—1.65
September.........	54.4	—2.5	86.0	29.0	....	3.70	3.70	+ .53
October...........	41.1	—1.2	76 0	13 5	2.6	2.95	3.21	+ .02
November	36.2	+4.4	67.0	— 3.0	8.0	2.92	3.72	+ .20
December...	18.2	+1.7	41.5	—14.0	20.2	.67	2.69	— .37
Year...........	38.9	— .6	88.5	—24.0	108 6	26.77	37.63	+ .56
Maitland.		[4 yrs.]						[4 yrs.]
(Grenville Co.)—								
January...........	18.5	+ .5	44.0	—15.0	8.0	4.20	5.00	— .49
February..........	19.2	+7.0	45.0	— 4 0	8.5	1.30	2.15	+ .51
March.............	24.4	+5.6	42.0	0.0	17.5	.70	2.45	+ .52
April.............	38.6	+ .9	66.0	16.0	1.0	2 12	2.22	+ 01
May...............	52 8	+1.5	74.0	32.0	....	4.19	4.19	+ .83
June	63.2	—1.0	85.0	41.0	....	1.82	1.82	—1.21
July..............	66.5	—1.2	87.0	47.0	....	3.84	3.84	+1.27
August...	67.4	+ .1	91.0	43.0	....	2.43	2.43	+ .96
September.........	59.2	—2.5	83.0	40.0	....	3.35	3.35	+ .51
October...........	46.4	—1.0	79.0	40.0	....	1.53	1.53	— .66
November..........	33.7	—1.0	66.0	21.0	2.0	1.40	1.60	— .28
December..........	16.8	—1.3	39 0	12.0	1.5	2.19	2.34	+ .07
Year...........	42.2	—1.6	91.0	—15.0	38.50	29.07	32.92	+5.37
Marksville.		[4 yrs.]						[4 yrs.]
(St. Joseph Island)—								
January....... ...	20.3	+ .5	40.0	0.0	13.0	....	1.30	—1.87
February..........	19.9	+3.1	39.0	1.0	24.0	1.0	3.40	+1.00
March	22.6	— .5	42.0	1.0	32.0	....	3.20	+ .41
April.............	34.5	— .6	52.0	7.0	13.0	2.5	3.80	+1.62
May	48.8	+1.4	83.0	20.0	2.0	2.81	3.01	— .47
June	62.1	+1.1	88.0	36.0	....	.97	.97	—2.00
July..............	64.8	— .1	85.0	47.0	....	3.25	3.25	— .08
August............	64.8	+1.8	87.0	35.0	....	4 71	4.71	+ .93
September	53.1	—6 2	73 0	30.0	....	3.67	3.67	— .11
October...........	43.0	—1.1	68.0	17.0	....	3.07	3.07	+ .01
November	37 2	+2.3	61.0	8.0	4.0	1.21	1.61	—1.09
December..........	23.3	+2.5	44.0	0.0	22.0	.50	2.70	+ .49
Year...........	41.2	+ .4	88.0	0.0	110.0	23.69	34.69	+ .87

TABLE I.—WEATHER REPORT OF 1909.—Concluded.

Month.	Mean temperature.	†Departure from normal,	Highest temperature.	Lowest temperature.	Snowfall in inches.	Rainfall in inches.	*Precipitation in inches.	†Departure from normal.
St. Catharines. (Lincoln Co.)—		[3 yrs.]						[3 yrs.]
January	29.0	+1.8	61.0	—9.0	17.1	.72	2.43	+ .7
February	27.8	+5.9	54.0	—2.0	13.0	1.62	2.92	+ .26
March	28.4	—2.6	45.0	12.0	8.0	1.82	2.62	— .13
April	42.7	+1.7	70.0	17.0	....	3.31	3.31	+1.06
May	53.2	+3.3	78.0	33.0	....	5.05	5.05	+1.45
June	65.1	+ .3	88.0	42.0	....	1.24	1.24	....
July	69.6	— .4	89.0	50.0	....	2.98	2.98	....
August	69.5	+1.8	93.0	44.0	....	1.88	1.88	+ .05
September	60.6	—2.9	93.0	40.0	....	3.61	3.61	+1.05
October	46.2	—2.8	78.0	24.0	....	2.30	2.30	+ .41
November	43.6	+3.1	69.0	23.0	3.00	2.81	3.11	+ .69
December	27.1	—2.3	53.0	4.0	2.05	1.72	1.93	— .63
Year	46.9	+0.0	93.0	—9.0	43.15	29.06	33.38	....
Sturgeon Lake. (Victoria Co.)—		[2 yrs.						[2 yrs.
January	18.1	+ .2	43.0	0.0	11.0	1.44	2.54	+ .47
February	21.8	+3.5	47.0	2.0	11.0	.53	1.63	— .88
March	27.1	+1.6	41.0	3.0	10.0	....	1.00	+ .10
April	36.3	— .7	62.0	7.0	.5	5.50	5.55	+1.53
May	50.0	—2.2	77.0	30 0	3.5	2.70	3.05	+ .33
June	65.6	+ .3	89.0	39.0	....	.50	.50	— .30
July	67.6	— 8	87.0	45.0	....	3.50	3.50	+ .32
August	66.9	+ .8	89.0	37.0	....	3.62	3.62	+1.11
September	57.2	—2.9	88.0	37.0	....	1.78	1.78	+ .22
October	....	....	....	....	....	....	....	....
November	....	....	....	....	....	....	....	....
December	20.2	— .7	60.0	2.0	12.41	.21	1.45	— .02
Walkerton. (Bruce Co —		[2 yrs.]						[2 yrs.
January	....	....	....	....	....	....	....	....
February	....	....	....	....	....	....	....	....
March	26.8	....	42.0	4.0	....	....	....	....
April	....	....	....	....	....	....	....	....
May	....	....	....	....	....	....	....	....
June	63.3	—1.2	86.0	37.0	....	1.88	1.88	— .37
July	66.9	—1.1	86.0	45.0	....	3.26	3.26	+ .44
August	67.8	+1.6	91.0	41.0	....	3.10	3.10	+1.27
September	58.4	—2.6	90.0	35.0	....	2.81	2.81	+ .57
October	44.5	—3.3	77.0	24.0	....	3.86	3.86	+1.51
November	37.4	—1.4	68.0	3.0	....	4.42	4.42	+ .78
December	23.2	—1.1	47.5	0.0	....	.98	.98	+ .34

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* Calculated by ten inches of snow being equivalent to one inch of rain.

† Figures in brackets in column, "Departure from Normal," indicate the number of years on which normals are based.

TABLE II.—LENGTH OF SEASON AT VARIOUS STATIONS.

Station.	Last killing frost in spring.		First killing frost in autumn.		No. of days between 1909.	Average length of season free from killing frost.
	Date.	Degree.	Date.	Degree.		
Guelph	May 2	30	Oct. 14	29	165	146 (22 yrs.)
Bay View, P.E.I.	May 21	27	Oct. 21	28	153	150 (3 yrs.)
Jordan Harbor	April 30	26	Oct. 20	28	173	162 (2 yrs.)
Leamington	....	....	Oct. 19	30	....	
Magnetawan	May 11	30	Aug. 30	28.5	111	121 (4 yrs.)
Maitland	April 30	27	Oct. 18	30	171	149 (4 yrs.)
Marksville	May 11	29	Sept. 27	30	139	133 (4 yrs.)
St. Catharines	April 30	30	Oct. 20	29	176	167 (3 yrs.
Sturgeon Lake	May 2	30	....	....	....	
Walkerton	May 2	29	Oct. 21	24	146	148 (2 yrs.)

Wind records have been kept throughout the year and Table III. will give an idea of the velocities.

TABLE III.—WIND RECORD AT GUELPH.

—	Miles of wind.	No. of days on which records were kept.	Average wind per day.	Average wind per hour.	Windiest day.				Calmest day.			
					Total miles.	Miles per hour.	Miles on windiest hour.	Least windy hour.	Total miles.	Miles per hour.	Windiest hour.	Calmest hr.
January	9,476	30.3	312 7	13.0	659	27.4	35	16	23	1.0	5	0
February	9,532	26.5	359 7	15.0	689	28.7	47	9	93	3.9	7	0
March	9,843	31.0	317.5	13.2	632	26.3	37	12	114	4.7	15	1
April	10,611	30.0	353.7	14.7	793	33.0	52	11	136	5.7	18	0
May	7,164	24.6	291.2	12.1	606	25.3	32	12	107	4.5	9	0
June	6,028	30.0	200.9	8.4	411	17.1	29	8	74	3.1	10	0
July	6,548	31.0	211.3	8.8	405	16.9	26	9	75	3.1	9	0
August	5,283	30.6	172.6	7.2	301	12.5	20	7	51	2.1	6	0
September	4,925	22.4	219.8	9.1	356	14.8	29	3	119	4.9	17	2
October	7,591	31.0	244.9	10.2	510	21.2	32	15	67	2.8	7	0
November	7,817	26 1	284.0	12.1	629	26.2	35	17	60	2.5	8	0
December	10,174	31.0	328.2	13.7	641	26.7	36	23	108	4.5	8	0
The year	94,992	344.5	275.7	11.5	793	33.0	52	11	23	1.0	5	0

LIGHTNING REPORT.

Reports of damage done by lightning have been collected this year as previously. The results are given in tables IV. to VII.

TABLE IV.—BUILDINGS STRUCK IN 1909.

How reported	Barns.				Houses.				Others.			
	Burned.	Damaged.	Totals.	Loss.	Burned.	Damaged.	Totals.	Loss.	Burned.	Damagen.	Totals.	Loss.
				$ c.				$ c				$ c.
Personally	7	10	17	17,793 20	....	9	9	237 22	....	2	2	10 00
Newspapers	12	3	15	*15,699 90	1	2	3	*79 08	....	5	5	*25 00

*Loss at same rate as those personally reported.
Total loss on all buildings, $33,844.40.

TABLE V. OTHER INFORMATION REGARDING BARNS.

Barns personally reported.

Windmill.	
Mill on or near	*1
Mo mill	13
Not specified	3
Location.	
On hill	2
On knoll	3
On plain	12

Distance from Railway.	
¼ mile	2
½ "	4
¾ "	3
1 "	1
2 "	1
3 "	2
4 "	2
6 "	1
Not specified	1

* Lightning struck this mill.

TABLE VI. ANIMALS STRUCK.

Animals.	In field.	By fence.	In or near building.	Location not reported.	Totals 1909.	Totals 1901–1909.
Cattle	2	2	46	8	58	309
Sheep						138
Horses			7	4	11	84
Pigs			3	1	4	26

TABLE VII. SUMMARY OF TREES STRUCK FROM 1901-1909.

Year.	Elm.	Pine.	Oak.	Maple.	Apple.	Basswood.	Poplar.	Willow.	Ash.	Hemlock.	Balsam.	Cedar.	Spruce.	Cherry.	Chestnut.	Hickory.	Birch.	Beech.	Butternut.	Fir.	Walnut.	Pear.	Thorn.	Total.
1901-1908	40	25	16	12	8	9	6	5	5	5	4	4	4	2	2	2	2	1	1	1	1	1	1	155
1909	2	..	..	1	..	..	..	1	..	..	1	..	..	1	.	..	..	..	..	..	..	..	..	6
1901-1909	42	25	16	13	8	9	6	6	5	5	5	4	4	3	2	2	2	1	1	1	1	1	1	161

DRAINAGE.

Surveying and Demonstration.

The work in drainage surveying has been continued, but the demands for assistance have increased very largely. During the year we have had four extra men engaged in this work, viz.: W. R. Reek, O. C. White, J. Spry and S. H. Gandier. The total number of applications for assistance was 302, the number of surveys made, 179; the number of acres surveyed, 5157. 43 demonstrations were held in various counties with an average attendance of 18. Of the 302 applications 223 were filed with the department. The other 79 applied to our drainage advisors in the field and the work was done for them at once. Of the 223 original applications we were able to attend to only 100. Thus you will see that we were not able to do quite half of the work required by the applications. Moreover, the applications are about doubling in number from year to year, *e.g.*, in 1906 we had 15; in 1907, 126; in 1908, 166; in 1909, 302. In view of the very rapid increase in demand and the fact that we have not been able to attend to half of our applications during the past year, and in view further of the unprecedented interest being taken in drainage during this autumn, the $1,000 appropriation which we have had during the past two years will be altogether inadequate for our requirements, and I would therefore suggest that the appropriation for drainage survey work should be largely increased.

Benefits of Drainage.

Early in the summer we wrote to a large number of the men for whom surveys had been made during 1906, 1907 and 1908, asking them if they had put in any of the drains, and if so to tell us what results they had obtained in the way of being able to sow their crops earlier, getting better looking crops as they grew, and better yields. Many very valuable reports were received, quotations from many of which are given in Bulletin No. 174 just being issued, entitled, "Farm Underdrainage—Does it Pay?" It was found that the gain in seeding time due to drainage ranges from one to six weeks, but the average was in the neighborhood of three to four weeks. This is a very important consideration, for it often means the difference between a good crop and a failure.

The difference in growing crops was shown by samples selected from the standing grain and sent in to the department. These were mounted and photographed, and cuts of them appear in the bulletin mentioned.

The difference in yield on drained and undrained land was very marked. Table VIII. shows the various reports and by whom they were made. The following quotations taken from the daily papers about the middle of October represent fairly well the prices that have prevailed throughout Ontario during the past fall: Wheat $1, barley 58c., oats 47c., peas 90c., corn 75c., hay in Toronto $16 to $20, in Guelph $14.50, straw in Toronto $8, in Guelph $8. If the reader will compute the value of the increases at these prices, allowing increase of one-half ton of straw per acre in each case, he will find it to range from $11.05 to $36.25 per acre, the average being $21.65, not counting the beans which do not constitute a general farming crop; that is, each acre drained on the farms of these men is producing an average of $21.65 more this year than before drainage.

TABLE VIII. DIFFERENCE IN YIELD ON DRAINED AND UNDRAINED LAND.

Grain.	Difference in Yield.			Persons reporting.
	Drained.	Undrained.	Difference.	
Barley	30–50	0	30–50	J. H. Clare, Chapman.
Barley			20	Jos. Lapp, Cedar Grove.
Barley	50	30	20	John McIntaggert, Brechin.
Barley	40	25	15	John A. McMahen, Petrolea.
Oats	35	0	35	Wm. Bell, Washago.
Oats	40–100	0	40–100	J. H. Clare, Chapman.
Oats	50	31	19	John McIntaggert, Brechin.
Oats	80	45	35	Jas. Marshall, Hamilton.
Oats	50	10	40	Peter W. Scott, Belgrave.
Oats	50	35	15	J. E. Tovey, Perth.
Peas	25	15	10	Peter W. Scott, Belgrave.
Wheat, fall	45	25	20	Jas. Clayton, Cedar Springs.
Wheat, fall	0	0	30	R. H. McCurdy, Vienna.
Wheat, fall	45	25	20	Jas. Marshall, Hamilton.
Wheat, spring	25	15	10	John McIntaggert, Brechin.
Straw			about doubled	J. H. Clare, Chapman.
Hay	2–3 tons	0	2–3 tons	J. H. Clare, Chapman.
Corn	80	56	24	T. S. Biggar, Walkerville.
Corn			15–20	W. J. Dolsen, Chatham.
Corn			*33%	Jas. Martin, Amherstburg.
Corn			*33%	J. B. Rhodes, Chatham.
Corn			*33%	W. H. Winter, Chatham.
Beans	38	3	35	Jas. Clayton, Cedar Springs.

* 33% = about 20 bushels per acre.

UNDERDRAINAGE AS AN INVESTMENT.

Drainage as an investment has been touched indirectly in the reports of our correspondents. Some have stated that their drains paid for themselves in one year, some in two years. Even where the drains were put less than two rods apart and the cost ran up to $40 an acre they paid for themselves in two crops. Has the farmer any other place where he can invest his money and have the principal returned to him every year, or every two years? But, says someone who has been rendered poor and kept so by the wetness of the land, "We haven't the principal and how can we invest it?" For such cases the Province has long since made provision in the Tile, Stone, and Timber Drainage Act (R.S.O., 1897, chapter 41, revised in chapter 22, 9 Edward VII., 1909) by which any township is authorized to borrow money from the Province to lend to farmers for underdrainage purposes. When an individual wishes to borrow money in this way he applies to the Township Council, and if they approve of the loan to him they pass the necessary by-law, if one has not already been passed, and issue debentures which the Province buys from the Consolidated Revenue Fund, and lend the money to the applicant, who pays it back on the instalment plan, $7.36 per year for twenty years on every $100 borrowed. Now tile drainage to-day costs about $14 to $40 an acre, depending on depth, distance apart, size and price of tile, kind of digging, etc., say $25 average; hence, if a man borrowed $100 under the Drainage Aid Act, it would drain about four acres, and the annual payment would be only $7.36, or $1.84 an acre, while, as pointed out above, the annual increase in crop reported by men who have put in drains is worth $11 to $36 an acre. Surely a man is safe in borrowing $1.84 to get back $11 to $36. Surely that is a good investment. Surely even the poorest "can afford to underdrain" with this assistance. The writer knows of at least one man who, with very little capital, bought a large wet farm under heavy mortgage and at once underdrained it with money borrowed under the Tile, Stone and Timber Drainage Act. To-day he is well off, and still a man in his prime.

THE VALUE OF UNDERDRAINAGE TO THE PROVINCE.

Learning that each acre that has been drained produces on the average about $20 more per year than before led us to enquire how much land is being drained annually. The Department of Mines, Toronto, has for many years been keeping a record of the number of tile manufactured in Ontario. From their reports we learn that the number in 1900 was 19,544,000, and that this gradually dropped to 15,000,000 in 1905, but it has risen since then to 24,800,000 in 1908. Reports for 1909, which the tile manufacturers have sent us direct, indicate that this year the output is approximately 29,000,000, or almost twice what it was when we began our drainage campaign in 1905. Is it too much to claim that, in the main, the accumulated increase in tile output since 1905 represents the benefit that the Ontario Agricultural College has been to the farmers of the Province directly and indirectly on this one line of farm drainage? In view of the previous falling off in drainage, we think not. If this ground is well taken, let us see the result. The accumulated increase since 1905 amounts to 27,078,000 feet of tile, which would drain 53,178 acres more than would have been drained had the rate in 1905 continued, and the value of the increased crop on this area at $20 per acre, would be $1,063,560 annually.

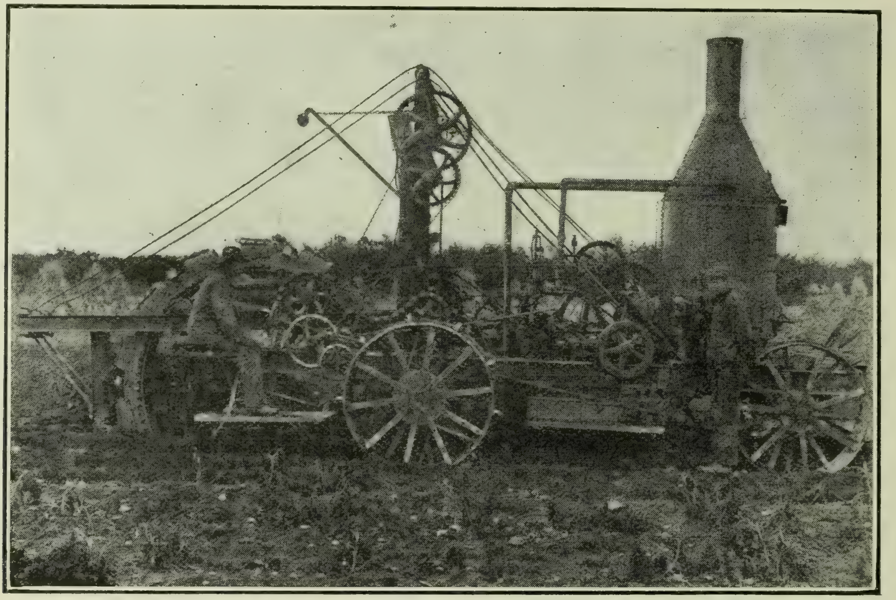
The total number of acres drained during the years 1905-1909 is 193,436, the product of which is worth $3,858,720 more each year than before being drained. All these estimates are based on reports from farmers and tile manufacturers.

To gain a comprehensive view of what underdrainage may mean we must consider the Province as a whole and estimate what proportion of it needs drainage. As a result of careful enquiry and statements of our underdrainage advisors, based on examination of many sections of the Province, I have made the calculation that at least one-third of the cleared land of the Province, or 4,710,000 acres, is in urgent need of underdrainage. If that were all drained and each acre produced $20 more than it does now, the increase in crop would be worth $94,200,000 annually. The value of all field crops in Ontario in 1908, according to the latest report of the Bureau of Industries, was $164,077,000. Thus drainage of all the cleared land needing it will increase Ontario's field crop 57.4 per cent. At the present rate it would take 100 years to complete the drainage.

But that does not tell the whole story of the possibilities of underdrainage. Ontario has 2¼ million acres of slash land and 2¾ millions of swamp, marsh and waste land, or five millions altogether, much of which remains in this comparatively useless state only because it would be too wet for cultivation. On much of the slash and marsh a comparatively small amount of labor would do the necessary clearing and underdrainage would reclaim the land and make it equal to the best. The swamp too, when cleaned, would yield to drainage in the same way. Thus an immense area could be added to the arable land of the Province.

CONDITIONS ON WHICH DRAINAGE SURVEYS ARE MADE.

The reader's attention has already been drawn to the fact that the department of Physics is in the habit of making drainage surveys for those who apply for such assistance. It may not be out of place before leaving this part of the subject to state the conditions on which these surveys are made. There is no charge for the services of our drainage advisers, their salary being paid from a special drainage appropriation, but their travelling expenses, consisting of railway fare at a cent a mile each way for this work, meals on the way if any, and cartage of instruments if any, must be paid by the parties for whom surveys are made. They must be met at the station and returned to it, accommodated while on the job and furnished with the necessary assistance for the work. As several surveys are usually made on one trip, the actual cash outlay for any one farmer is not likely to exceed $2. It may be even less; or, in exceptional cases, where farmers live in remote sections, it might amount to $5.



The steam ditcher, working on the farm of J. A. Lind, Beamsville, Ont.

Those wishing surveys made should write to the Department of Physics, O.A.C., Guelph, whereupon regular application forms will be sent.

CONSTRUCTION OF DRAINS.

Besides the investigations as to the value of underdrainage, an exhaustive bulletin, No. 175, on "The Construction of Drains," has been prepared and is now in press. This embodies much of the information that has appeared in the annual reports from time to time. There is also considerable new material on the methods of drainage surveying followed by the department This bulletin on drainage construction is intended to serve as a manual for those actually engaged in putting in drains, and may be had on application to the Department of Agriculture, Toronto.

TRACTION DITCHER.

In the last annual report of the department reference was made to the Buckeye Traction Ditcher for digging the trenches for the tile, based upon a personal inspection of one of these machines in operation and a visit to the factory. The writer was instrumental in having his brother, Mr. Walter Day, Beamsville, Ontario, purchase one of these machines. It began operations about the 25th of May and has not been short of work since that time. The illustration shows this machine in operation. Some of the land in which it has worked has been very stony and two shafts had to be strengthened to handle these stones. Since that was done there has been practically no lost time with the machine and it has proven entirely satisfactory. From my intimate knowledge of its performance I have no hesitation in saying without reserve that the ditching machine has come to stay. On the stoniest job the machine averaged 50 rods per day, and on the cleanest job 100 rods a day including all stops. On various occasions it has dug in the neighborhood of 130 to 140 rods in a day, making one, two or three sets for this amount.

About the middle of the summer another of these machines was purchased and brought into Essex by Mr. Wilford Finlin. His machine, too, has given good satisfaction. The traction ditcher, when generally introduced, will revolutionize tile drainage operations. It solves the labor problem and makes drainage a comparatively easy proposition.

CHANGES IN THE DEPARTMENT.

In February Mr. C. C. Thom, who had for almost three years been Demonstrator in this department, accepted a position at Pullman, Washington State. We were sorry to lose Mr. Thom at a time when permanence in the department was so desirable. Mr. W. R. Reek, then in his third year, assisted with the work of the department for the balance of the term. In May, Mr. R. R. Graham, B.A., was appointed Demonstrator. His work both in laboratory and lectures has proved very acceptable to the students and satisfactory to the department.

Respectfully submitted,

WM. H. DAY.

PART VI.

PROFESSOR OF CHEMISTRY.

To the President of the Ontario Agricultural College:

Sir,—I beg to submit my report for the year 1909.

Instruction.

A very large part of my time and of those associated with me in the work of the department has been devoted to carrying out the prescribed courses of lectures and laboratory work. This work is fully outlined in the College Calendar, and has been referred to in previous reports; therefore, it will not be necessary for me to make any detailed statement of it here. I might state, however, that this year we gave two new courses in applied Chemistry, namely, Chemistry of Fruits, Vegetables and Fermentation, and the Chemistry of Insecticides and Fungicides. The first course was given to the Fourth Year Specialists in Horticulture and Bacteriology, and the second to the Specialists in Horticulture and Biology. The demand for the first course of study arose out of the much felt need of the Horticulturists and Bacteriologists having a fuller knowledge of the chemistry of fruits and vegetables in relation to their ripening, storing, canning, etc., and the chemical changes that take place in the fermentation of these products. The second course was given in response to the growing importance of a thorough chemical knowledge of the various substances used in combating insect and fungus pests. We now give courses in Applied Chemistry to all the optional courses of study in the senior year.

For a number of years we have been giving ten half days' laboratory instruction to each person taking the three months' course in Dairying. Most of the members of this class are cheese or butter makers who have practically no knowledge of chemistry, consequently, we cannot go deeply into the chemistry of such a complex substance as milk; but by very simple methods we have them separate and examine the various constituents of milk, learn methods of detecting some of the more common preservatives sometimes used in milk and cream, prove the chemical changes that take place in the curd as it ripens into good, wholesome cheese, etc. We also give the class twelve lectures on the chemistry of milk and its products. These lectures were prepared with the object of explaining many of the operations of the dairy and of encouraging intelligent, thoughtful work, and thus making the work more interesting.

Lectures were also given to the students of the short courses in Live Stock, Poultry, and Horticulture. We also took a share in the instruction of the Normal School students who took the three months' course in Agriculture, and the school teachers taking the four weeks' course in July.

Each year we have to give considerable time to the directing of men who are doing thesis work in this department. Chemistry explains so many agricultural problems that it is to be expected that a large percentage of the men will select subjects involving work in the chemical laboratories. The results obtained in these studies are frequently valuable, but the part of most value to the student is the training he receives in searching the library for information on his subject, in learning how to attack his subject, and in gaining some idea of what research really means.

Another phase of instruction work which is continually assuming greater proportions is the giving of information by correspondence, articles published in the agricultural papers, bulletins, and by addressing farmers meetings of various kinds. We are also frequently called upon to present results of our investigation work at the conventions of Dairymen, Fruit Growers, Millers, Bakers, etc. These are all avenues by means of which we are privileged to spread the information we have collected and we cheerfully make use of them all. In August, I attended the meeting of the British Association for the Advancement of Science held this year in Winnipeg, and at a joint meeting of the Chemistry, Botany, and Agricultural sections read a paper on the milling and baking value of the characteristics grades of wheat of the Canadian West.

LABORATORY WORK.

During the past year the analytical work done under my own supervision has been chiefly along the line of cattle foods, human foods, insecticides and fungicides, milk and cheese. There has also been about the usual number of miscellaneous samples, some of which incurred considerable work, while others were very quickly examined.

The samples analyzed may be classified as follows: Cattle foods, 66; human foods, 43; insecticides and fungicides, 62; milk and cheese, 52; miscellaneous, 29; total 252.

CATTLE FEEDS.

All feeders of live stock are interested in the nature and composition of the ever increasing number of different kinds of mill by-products appearing on the market. Most of these materials are valuable additions to our lists of feeds and are residues from the manufacture of some specific product from the crops of the farm. They contain all the food constituents commonly found in fodders, roots, grains, etc., but in different proportions. For instance, the by-products, gluten meal and gluten feed, obtained in the manufacture of starch, are richer in protein than the corn from which they are made, because of the removal of starch. The same is true of wheat bran, because flour made from wheat is richer in carbohydrates than the wheat. Cotton-seed meal, linseed meal, brewers' grains, etc., are all of the same class. On the other hand, in the manufacture of oatmeal, one of the chief by-products is the hull of the grain, which is largely composed of crude fibre, a woody, comparatively indigestible substance which has very little food value.

In some cases the name of the by-product indicates its source and, therefore, the buyer can form some idea of its feeding value, but in other instances the name gives no indication of the source of the food or of its nutritive value.

As nearly all these by-product materials are valuable foods and their intelligent use is to be encouraged, we have analyzed all samples sent to us during the year and given the sender as full information as we could concerning their use. The results of the analyses are incorporated in the following table:

COMPOSITION OF VARIOUS KINDS OF CATTLE FOODS ANALYSED.

Serial Number	Name of Feed.	Moisture.	Crude Protein.	Crude Fat.	Crude Fibre.	Soluble Carbo-hydrates	Ash.
	(a) MILL BY-PRODUCTS †	%	%	%	%	%	%
17	Cotton Seed Meal................	5.94	39.87	8.99	8.83	29.46	6.91
16	" "	6.82	36.50	9.11	9.62	30.90	7.05
7	Ground Linseed Meal............	5.71	21.94	31.14	5.38	28.17	7.66
15	Linseed Meal....................	4.27	23.34	31.48	4.50	30.18	6.23
102	Oil Cake, nutted form...........	9.63	33.05	9.29	15.30	27.22	5.51
3	Gluten Meal....................	5.52	20.73	7.77	4.47	60.97	0.54
41	Gluten Meal and pea bran mixture	7.57	14.61	4.35	....	*68.65	4.82
149	Gluten Feed	8.00	16.89	10.86	16.17	47.19	0.89
4	Dried Brewers' Grain............	5.83	15.49	4.89	23.20	46.86	3.73
18	Re-ground Oat Hulls	5.69	2.39	1.98	27.98	55.88	6.08
246	" "	5.25	1.54	0.96	35.51	51.10	5.64
159	Oat Dust	5.57	12.36	6.06	21.76	48.06	6.19
32	Feed Oat Meal..................	4.56	15.15	7.45	3.05	67.38	2.41
54	Barley Germ Meal	5.96	17.16	7.42	....	*64.77	4.69
61	Bran	7.50	13.94	5.38	10.42	56.92	5.84
78	Bran.	....	12.93	....	....	....	....
160	Bran .... :..............	....	14.78	5.39	14.89	....	....
64	Ground Cocoa Shells.............	7.50	13.96	3.92	17.80	48.12	8.70
1	Sugar Beet Meal...............	7.89	8.17	0.59	18.55	61.88	2.92
66	Beet Meal	9.10	7.63	1.12	18.45	60.90	2.80
	(b) MILL BY-PRODUCTS ‡						
2	Molasses Stock Food.............	6.43	9.05	0.50	11.22	65.93	6.87
33	Oat Feed	4.39	4.32	3.12	25.25	42.55	5.47
157	Oat Feed....................	5.24	4.54	2.15	31.41	50.82	5.84
22	Cattle Feeding Stuff	15.76	15.87	3.35	10.20	47.09	7.93
31	Poultry Meal....................	9.13	12.33	4.62	....	*70.61	3.31
56	Manitoba Stock Feed............	6.48	13.28	12.74	....	*53.54	13.96
57	Cattle Feed.....................	5.97	4.24	2.12	21.98	60.74	4.95
58	"	6.51	6.96	3.04	15.39	63.82	4.28
59	Banner Cattle Feed	7.50	6.79	3.63	8.56	70.51	3.01
247	" "	8.61	9.03	3.66	8.91	67.37	2.42
65	Molac Feed	8.40	14.30	4.05	10.78	57.17	5.30
103	"	11.58	14.09	4.60	13.77	51.00	4.96
248	Molac Dairy Feed	7.95	14.57	3.71	13.44	54.41	5.92
249	" Horse Feed	7.99	10.71	3.48	14.15	57.65	6.02
67	Ground Feed.....................	7.30	12.29	7.00	9.56	53.87	9.98
70	Feed	8.10	14.47	4.65	17.61	48.77	6.40
72	Rex Sugar Food..................	11.30	8.37	2.07	4.97	60.09	13.20
82	Tillson's Calf Meal..:	7.50	22.30	8.96	7.90	47.74	5.50
83	" "	7.60	25.87	8.91	7.35	44.47	5.80
84	" Dairy Feed.............	7.60	16.25	5.25	17.39	48.01	5.50
85	" "	7.10	16.94	5.29	16.60	47.87	6.20
156	" " old standard..	7.09	18.83	6.72	18.13	44.72	4.51
158	" " new standard.	6.30	17.52	5.44	21.96	42.93	4.85
89	Dairy Feed ....:	10.16	16.53	4.71	15.96	47.13	5.51
93	Stock Feed	9.28	11.71	7.15	14.18	45.88	9.80
154	Jersey Feed.....................	7.09	11.19	4.95	20.73	51.88	4.16
155	Low Grade......................	6.80	17.51	9.86	10.01	52.40	3.42
161	Boston.	6.63	6.18	2.20	27.66	52.81	4.52
162	Eagle	9.14	11.31	3.25	13.41	59.93	2.96
163	Edinboro..............	9.01	10.48	3.25	13.25	60.77	3.24

† Mill Products whose names give an indication as to their probable composition.

‡ Mill Products whose names give no indication of their probable composition.

* Including fibre.

COMPOSITION OF VARIOUS KINDS OF CATTLE FOODS ANALYSED.—Continued.

Serial Number	Name of Feed.	Moisture.	Crude Protein.	Crude Fat.	Crude Fibre.	Soluble Carbo-hydrates.	Ash.
		%	%	%	%	%	%
164	Dandy	8.92	10.33	3.29	10.50	64.11	2.85
165	Durham	8.25	9.74	3.17	13.80	62.00	3.04
166	Ruby	8.04	8.34	2.66	19.64	57.71	3.61
167	Mixed Feed	10.23	9.05	3.80	7.68	66.69	2.55
245	Purina Scratch Feed	10.05	9.91	3.84	4.06	70.46	1.68
250	Schumacher	8.17	11.54	3.92	11.51	61.61	3.25
251	Victor	7.44	8.57	3.67	13.58	64.75	1.99
	(c) FODDERS						
19	Silage No. I	72.31	1.38	0.41	6.66	17.87	1.37
20	" No. II	69.01	1.32	0.44	8.17	19.91	1.15
21	" No. III	51.53	2.36	1.40	8.68	33.71	2.06
37	Siberian Millet	5.24	6.05	2.50	32.26	47.68	6.27
111	Alfalfa	81.07	3.95	1.03	4.42	7.84	1.69
112	"	76.29	4.95	1.06	6.08	9.59	2.03
	(d) GRAINS.						
104	Whole Oats	10.58	10.27	5.10	12.36	58.71	2.98
100	Spring Wheat (Manitoba)	10.59	11.17	2.37	....	*73.91	1.96
101	Fall Wheat (Alberta)	10.35	11.17	2.05	....	*74.72	1.71

The two samples of cotton-seed meal are a little lower in protein and fat than samples analyzed in this laboratory and reported in Bulletin No. 138. The average results then obtained were: protein, 44.18 per cent., fat, 13.65 per cent.

Linseed meal, or oil-cake, is the residue left after extracting the oil from flax-seed by pressure or by fat solvents. The meals are, therefore, poorer in fat and richer in the remaining food constituents than the material from which they were prepared. Evidently two samples, Nos. 7 and 15, were not extracted residues, but probably ground flaxseed. Sample No. 102 is, apparently, pure nutted linseed cake and is slightly better than the most of the samples of these materials we have analyzed.

Good gluten meals should contain more protein than was found in the samples analyzed. Frequently, genuine gluten meals will have as much as 30 to 35 per cent. of protein, and the gluten feeds as much as 25 per cent. of protein.

Of the foods in class A, only one, No. 18, a sample of oat hulls, has less than 7 per cent. of proteids. Such a food is dear at any price to the farmer, who has plenty of fibrous materials in hay and straw. In fact, it is doubtful if it will pay a farmer who has plenty of home grown roughage to purchase feeds that carry less than 8 or 9 per cent. of protein. What he requires is feeds rich in protein to supplement the deficiency of that constituent in the coarser home grown materials.

There is a growing tendency to mix certain of the mill by-products and sell the mixture under a trade name which gives no clue to their probable feeding value. In buying such a food for the first time, a farmer must depend upon the statement of the manufacturer or his agent as to its nutritive value, or upon the opinion of some one who has given the food a trial. This difficulty will be largely overcome when the Commercial Feeding Stuffs Act comes into force. This Act was passed by the Senate and House of Commons during the last session and comes into force on the first day of January, 1910.

This Act provides that no commercial feeding stuff can be legally offered for sale in the Dominion of Canada until it is registered with the Inland Revenue Department. It is then given a registration number, which, together with the guaranteed per cent. of protein, fat and fibre, must be affixed by the manufacturer, or agent, to every package of commercial feeding stuff sold or offered for sale. The statement required is as follows:

1. Name of Brand ....
2. Registration number ....
3. Name and address of manufacturer ....
4. Guaranteed analysis ....

This may either be printed on the sack, or a printed tag bearing the required information may be attached to the package.

The Act defines a commercial feeding stuff as follows: "Commercial feeding stuff," "feeding stuff," and "feed" mean any article offered for sale for the feeding of domestic animals, and feeds claimed to possess medicinal as well as nutritive properties, excepting only hay and straw, roots, the whole seeds or the mixed or unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat or flax seed; wet brewers' grain; the bran or middlings from either wheat, rye, oats, peas or buckwheat sold separately and not mixed with other substances."

It will be noticed that whole seeds or the mixed or unmixed meals made directly from certain grains are exempted, as are also bran and middlings from either wheat, rye, oats, peas or buckwheat so long as these are sold separately and not mixed with other substances. There was no desire on the part of the framers of the Act to in any way hamper trade in these commercial products. Therefore, these common, well-known products that are sold in large quantities locally, were not included in the Act. It is recognized, however, that fraud has been practised in the mixing of oat hulls with wheat bran, and that meal from mixed grains may be adulterated. To check this without putting the manufacturers to the inconvenience and expense of stamping the composition on the package, it was decided to deal with the adulteration of these products under the Adulteration Act. With the object of determining a fair standard composition, the chemist of the Inland Revenue Department collected and analyzed over five hundred samples of bran, middlings and mixed feed or "chop." Basing his decision on these analyses, and also on those made elsewhere, the chief chemist will recommend what he considers should be a fair minimum percentage of protein and fat and maximum percentage of fibre in pure products of this nature. Thus, if after all the analyses are completed he finds that good wheat bran should contain not less than 14 per cent. of protein, 3 per cent. fat and not more than 10 per cent. of crude fibre, these figures may be accepted as a standard for bran. If, then, bran offered for sale be found on analysis to contain less of the first two or more of the last named constituents, it would be deemed adulterated. It is expected that the adulteration of these more common products may be controlled in this way.

The Commercial Feeding Stuffs Act ought to be decidedly beneficial in three ways:

1. It will protect the stock feeder against low grade and mixed by-products with which he is not familiar.

2. It will protect the manufacturer and dealer against dishonest competition.

3. It will promote a more intelligent use of the mill by-products, and thus directly help to bring about a more economic use of all feeding stuffs.

It is to be hoped that farmers, dairymen, and all feeders of live stock will make themselves familiar with the terms of the Act, and so study the composition and price of the feeds offered for sale that they will be able to make the best possible use of these in supplementing the home grown roughage in producing economic gain, whether for growth or fattening or for milk production.

We have determined the digestibility of a large number of these mill by-products and hope to get the results out in bulletin form before the end of the year. These results ought to further aid in the intelligent use of these new and valuable cattle foods.

Corn Silage. The samples of silage were sent to us by H. Eilber, M.P.P., Huron County, in January last, with a request that we determine their feeding value. The desire for the information arose out of the fact that a number of the farmers of that county were discussing the proper stage of maturity to cut corn for the silo. The samples were collected by the farmers interested and the following notes supplied:

No. 1. Variety, Improved Leaming; silo filled on or about the 30th September; leaves and stalks green, about half the cobs glazed, the rest in the dough stage.

No. 2. Variety, Improved Leaming and Early Huron mixed; silo filled 20th September; leaves and stalks green; cobs few and milky.

No. 3. Variety, Early Butler; silo filled 5th October; leaves and stalks very dry; cobs well matured.

The samples were analyzed and are reported under "fodders" in the previous table. It is evident that the analysis confirms the note regarding the dryness of sample No. 3. Pound for pound, the No. 3 sample of silage is much superior to that of either of the others, but if we compare them on the basis of the composition of the dry matter, the superiority is not so evident.

Composition of Silage on Water-free Basis.

	Protein.	Fat.	Fibre.	Soluble carbohydrates.	Ash.
Silage No. 1................	4.98	1.48	24.0	64.53	5.01
" 2................	4.26	1.42	26.3	64.23	3.79
" 3................	4.87	2.88	17.7	69.54	5.01

The more matured sample, No. 3 does not contain more protein, but very probably more of the total amount will be in the higher and more valuable condition. It does contain more fat and soluble carbohydrates and less fibre, so that, pound for pound, of actual dry matter the matured product is the most valuable. We have no figures to calculate the pound of each food constituent produced per acre, but, taking the data available, it is apparent that the better the corn is matured before it is put into the silo the more valuable the silage.

ALFALFA. Only two samples of alfalfa were analyzed during the year. These samples were taken from cuttings that were made from day to day on this farm for feeding animals stabled during the summer. The figures given show the composition of the material in the grass condition, or just after it was cut. The high percentage of protein is well worthy of note. It is higher than is found in red clover, about three times as much as is found in corn silage, and over five times that found in roots. If we figure the percentage of protein in the material in the hay condition, 15 per cent. of moisture, we find that it amounts to 17.6 and 17.7, respectively, more than is found in any of the cereal grains, and as much as many of the so-called concentrates carry. Of course, it is not so fully digested as many of these latter foods, but it is very evident that alfalfa is a valuable food. If dairymen would make more use of it in feeding cows, there would be less need for buying the expensive concentrated feeds which are not grown on the farm.

HUMAN FOODS.

Our study of human foods has been almost altogether confined to wheat and flour, although some analyses of honey, syrups, cheese and breakfast foods have also been made. We have prepared a bulletin on flour and breadmaking, which we trust will be of general interest, especially to the home bread-maker.

COMPOSITION OF DIFFERENT KINDS AND GRADES OF WHEAT OF THE CROP OF 1908.

Grade of Wheat.	Moisture.	Fat.	Carbohydrates.	Fibre.	Ash.	Protein.	
						Wheat.	Flour.
SPRING WHEATS:							
Cargo lots.—							
No. 1 Northern	9.82	2.31	70.51	4.28	1.60	11.48	10.97
" 2 "	10.39	2.21	70.39	3.79	1.70	11.52	10.82
" 3 "	10.46	2.37	69.35	3.90	1.69	12.23	10.88
Winnipeg sample.—							
No. 1 Northern	10.60	2.15	70.27	3.78	1.54	11 66	9.98
" 2 "	10.25	2.21	70.09	4.53	1.59	11.33	10.02
" 3 "	10.26	2.43	69.84	4.44	1.67	11.36	10.08
WINTER WHEATS:							
No. 1 Alberta Red	10.09	1.87	72.26	3.51	1.56	10.71	9.69
" 2 " "	10.05	1.68	72.31	3.73	1.54	10.69	9.54
" 3 " "	10.10	1.81	71.88	3.75	1.53	10.93	9.20
No. 1 Alberta White	10.39	1.97	71.34	3.86	1.97	10.47	8.31
" 2 " "	10.63	1.82	70.58	4.16	2.04	10.77	8.74
" 3 " "	9.85	2.09	72.73	3.42	1.54	10.37	8.88
Ontario Fall Wheat	11.56	2.77	72.81*	....	2.12	10.74	....

*Including fibre.

WHEAT. During the year we had to make chemical analyses of Manitoba wheat of the grades Nos. 1, 2 and 3 Northern from cargo lots, and from samples received directly from Mr. D. Horn, Chief Grain Inspector, at Winnipeg, also the grades of winter wheat grown in the Province of Alberta, known as Nos. 1, 2 and 3 Alberta Red and Alberta White. All the samples were of the crop of 1908. Because of the general interest in these wheats, we have recorded the results here and also the composition of a mixture of Ontario Fall wheat.

The samples received from Mr. Horn were taken from the accumulation of car samples drawn for inspection purposes. The samples of cargo lots were taken from the elevator at Goderich, and would probably be freer of variations due to environment, in that they would represent the car lots mixed in the Fort William elevators, then mixed in loading on to the boats, and again into the elevator at Goderich. There was a greater difference in the baking quality of the flour from these two sets of samples than there was in the composition of the wheat.

The Alberta Red wheat is really the same variety that is grown in Ontario under the name of Turkey Red, and in the State of Kansas as Kansas Red. It is a hard wheat and gives much heavier yields per acre in Alberta than it does here. In Ontario, this hard wheat tends to become softer and does not make as good a bread flour as that grown in Kansas. The Alberta wheat, while not quite so rich in protein as the Manitoba Spring grades, makes a strong flour, which, for some reason not entirely understood, does not make a good bread flour, and is used almost entirely for blending with the softer wheats, where it is found to be very valuable. The Alberta White wheat is the same variety as we know as Dawson's Golden Chaff, and, in so far as we can judge from the comparatively few tests we have made, it is a little better than our wheat of the same variety, but is not equal to the Amber varieties grown in Ontario. The sample of Ontario wheat analyzed was a mixture of a number of varieties of Winter wheat. The similarity in the composition of all the wheats analyzed is very striking, yet we find that they have very different baking qualities.

BREAD. The following table gives the weight of a loaf of bread from each of the different samples of wheat. Exactly 340 grams of flour was used in making each loaf. The yield of bread was determined as accurately as care, even temperature, etc., would allow, and, while they possibly do not represent the yield that would be obtained in a large baking, they are comparative. The volume of the loaf was carefully determined by displacement of fine seed and is given in cubic centimeters. The comparative color and texture of the bread and general appearance of the loaf are represented by figures; the No. 1 samples of the different kinds of wheat being assigned the full 100 points, and the others were scored in percentage of this.

As might be expected, the results show a great similarity in the quality of the bread obtained from the two lots of Spring wheats, but the samples representative of cargo lots are more uniform in quality than those obtained from the Chief Grain Inspector. This is doubtless due to the more thorough mixing of wheat produced from different localities and grown under varying conditions, thus obliterating the influences of environment.

It will be noticed that the flour from the Alberta Red wheats contained as much gluten as the Spring wheat flour, No. 1 sample even exceeding all others; but they are much lower in water absorption, yield of bread and size of loaf. The volume of the loaf was approximately only 75 per cent. of that of the Spring wheats. In our work with flour we have always found that, generally speaking, the small loaf was the heavy one, doubtless due to the lesser surface for evaporation of water. No attempt was made to compare the quality of the bread with that from the Spring wheat as they are quite different; the texture particularly was not so good, the bread was darker, and the loaf had not that bold, fine appearance characteristic of the bread from the Spring wheats. In general, it was more like that obtained from the Durum wheats.

TABLE SHOWING WEIGHT, SIZE AND QUALITY OF A LOAF OF BREAD FROM 340 GRAMS OF EACH KIND OF FLOUR.

Grade of Wheat.	Per cent. of Protein.	Per cent. of wet Gluten.	Per cent. water absorb'd	Weight of loaf. Grams.	Volume of loaf. cc.	Quality of Bread.		
						Color.	Texture.	Appearance.
SPRING WHEAT:								
Winnipeg Sample.								
No. 1 Northern.....	9.98	33.10	67.2	511	2,540	100.0	100.0	100.0
" 2 "	10.02	31.20	67.5	503	2,520	102.0	98.0	98.0
" 3 "	10.08	30.17	68.0	496	2,770	102.0	96.0	96.0
Cargo lots.								
No. 1 Northern.....	10.97	33.83	67.2	510	2,630	100.0	101.0	101.0
" 2 "	10.32	32.87	67.5	504	2,600	100.0	102.0	100.0
" 3 "	10.88	33.79	67.5	510	2,540	100.0	100.0	99.0
WINTER WHEAT:								
Alberta Red,								
No. 1..............	9.69	37.53	55.6	491	1,990	100.0	100.0	100.0
No. 2..............	9.54	32.83	55.6	481	1,900	95.0	96.0	100.0
No. 3.............	9.20	32.07	56.9	492	1,800	93.0	94.0	98.0
Alberta White,								
No. 1..............	8.31	27.97	50.3	472	1,480	100.0	100.0	100.0
No. 2..............	8.74	29.07	51.6	471	1,470	95.0	85.0	....
No. 3.	8.88	27.90	51.6	482	1,600	97.0	104.0	108.0

FLOUR. The names assigned to the various grades of flour on the market are very numerous, as practically every flour miller has special names for his products. But, while there are a number of variations, nearly all flour may be graded as "patent," bakers', or straight. The well-known flours, Royal Household, Five Roses, and Purity, are patents which probably form about 35 per cent. of the total flour. Sometimes, however, the term "Standard patent," or "long patent," is used to designate a flour which forms about 90 to 95 per cent. of the total flour, and is, consequently, only a little better than a "straight." The "Bakers" grade, or "clears," usually represents about 55 per cent. of the flour after the patents have been taken off. A good bakers' grade of flour will yield about as much bread as a "patent," but the color of the bread is not so good. The low grade is got by grinding still closer to the bran layers and represents the remainder of the flour or about 10 per cent. The "straight" grade is the whole, or 100 per cent. of the flour from the wheat left in one grade. Of course, the percentage amount of the flour left in the various grades are not fixed, but are varied by every miller according to the quality of the wheat he is using, and the strength and color of the flour he wishes to produce.

We have analyzed a number of flours of various grades, and the bread made from them, but as the results are given in the bulletin on flour, we will not repeat them here. It will be sufficient to point out that it is a well recognized fact that the flour from the Western hard Spring wheats will produce a large, well-piled loaf of bread of excellent quality, and, because it absorbs a lot of water, it also gives a good yield of bread. These are desirable qualities and naturally explain why this class of flour is so popular for bread-making. The softer Ontario Winter wheat flour do not contain so much gluten and do not make so large, or, in the opinion of many people, so desirable a loaf of bread. This latter class of flour is, however, the best for pastry and cake purposes. In most of our Ontario flour mills it is also used for making the blended flours, which are simply mixtures of the Spring wheat and Winter wheat flours. The object of blending is to secure a flour that will make a loaf of bread with some of the size and texture usually got from Spring wheat flour, combined with the flavor of that from the Fall wheats.

NUTRITIVE VALUE OF BREAD FROM SPRING WHEAT AND WINTER WHEAT FLOURS COMPARED.

As pointed out above, the Winter wheat flour does not make as large nor as heavy a loaf of bread as the flours from the Spring wheat. Frequently, the loaf will not be more than two-thirds the size, even when exactly the same weight of flour is used. This has prompted the question, "Which of the two loaves actually furnishes the most nourishment?" To answer this question, we made bread from two standard flours and analyzed the bread.

The flours used in this work were the patent and bakers' grades from Manitoba spring wheat, an 85 per cent. from the same grade of wheat and an 85 per cent. from all Ontario soft Winter Wheat. The bread was made in the regular way in our flour-testing laboratory; in fact, the loaves were taken from some of the regular testing work. In this work we use 12 ounces of flour for a loaf, and each lot of flour receives exactly the same amount of yeast, salt, etc., and all the water it will absorb. The bread was weighed, dried, and the whole mass ground to an impalpable powder and analyzed. The average results of a number of analyses are given in the following table. As the actual size of the loaves, their color, texture, etc., do not enter into the problem, these data have been omitted. It may be stated, however, that the bread was all of good quality. Naturally, the loaves from the Ontario flour were not so large, but the bread was a fair sample of that got from these flours:

PERCENTAGE COMPOSITION OF THE BREAD.

Flour.	Average weight of loaf, gr'ms.	Water.	Protein.	Fat.	Carbohydrates.	Ash.
Patent	502	36.48	7.29	1.76	53.42	1.05
Bakers'	506	36.75	7.39	1.71	52.81	1.32
85% Manitoba	501	36.10	7.93	1.73	52.92	1.33
85% Ontario	468	32.90	5.74	1.63	58.58	1.15

It will be seen from the above that the 12 ounces, or 340 grams, of the various spring wheat flours produced about an equal weight of bread of very similar composition, while the Ontario winter wheat flour gave less bread with a lower water, protein and fat content, and a considerably greater amount of carbohydrates. This is as expected, as the soft flour is a starchy flour, poor in gluten, or, in protein.

In order that we may make a closer comparison of the amounts of the various food constituents furnished by each 340 grams of flour, the weight of protein, fat and carbohydrates contained in each loaf has been calculated and is given in the following table:

Flour.	Protein.	Fat.	Carbohydrates.	Ash.	Fuel Value.
Patent	36.60	8.84	268.17	5.27	1,399
Bakers'	37.39	8.65	267.22	6.68	1,393
85% Manitoba	39.73	8.67	265.13	6.66	1,388
85% Ontario	26.91	7.63	274.15	5 38	1,351

The bread from the Ontario winter wheat flour contains from 10 to 13 grams less protein, 1 gram less fat, and from 6 to 11 grams more of the carbohydrates.

It is generally assumed that, provided any given food is consumed as part of a well balanced dietary, the number of calories of heat it will produce when burned, or, in other words, its fuel value, is the best basis for making a comparison of the nutritive value. Taking this as the basis, we have the figures given in the last column. It will thus be seen that the soft wheat flour gave bread that contains approximately one-third less protein, or flesh-forming material, a little less fat, but more carbohydrates, and giving altogether nearly an equal food value. From these figures we must conclude that when bread is taken in the usual way as part of a mixed diet, bread from the soft wheat flour is nearly, or approximately, equal in nutritive value to that obtained from the hard spring wheats.

Flour Testing Work.

During the past year we have tested 218 samples of flour for millers and bakers. Most of the samples have come from this Province, but a few have been received from as far East as St. John, N.B., and as far West as the Rocky Mountains, and some from the State of Kansas. Only a few samples of wheat have been sent in for milling tests. The work has given us a chance to become familiar with the flour in use over a wide range of country.

The fact that we are prepared to do this type of commercial work is becoming more widely known among the millers, but we still get letters from millers enquiring if we do testing work. The bakers, who were really responsible for the installing of our flour-testing plant, have not sent many samples to us.

Every year we grind a number of samples of the standard grades of wheat from the West. This is done that we may make a comparison of the flour with that got from similar grades of the previous year. To see these results and to get information regarding the comparative strength of the various varieties of wheat grown on the College experimental plots, and on other subjects of general interest, the District Millers meet in our laboratory each Fall.

We are very pleased to be able to report that the wheat of this year's crop, both spring wheats from the West and Ontario fall wheats, contains more gluten and produces a flour that is much superior to that of last year.

Testing Varieties of Wheat.

During the past year we have milled and made baking tests of all the varieties of wheats grown on the Experimental Plots in 1908. It would add interest and value to the results if we could determine the yield of flour from each variety, but our mill is not suitable for this purpose, and, further, the amount of wheat available for the work is not sufficient. The best we can do is to make a straight grade flour from each wheat. We have only one year's test with the spring wheats and will not include them in the report of this year.

The following table gives the results of the baking tests with the Winter wheats of 1907 and 1908. The wheats of the 1908 crop were milled in January and allowed to age for two months before baking. They are all compared with a commercial straight grade flour which was used as a standard. The method of testing has been fully outlined in the reports of the last two years, consequently, it will not be necessary to repeat it here:

TABLE SHOWING RESULTS OF BAKING TESTS WITH ONTARIO WINTER WHEATS.

Name of Variety.	Crop.	Present absorption.	Net gluten.	Yield of bread.	Size of loaf.	Appearance.	Color.	Texture.	Quality of loaf.	Moisture.
		%	%	%	%	%	%	%	%	%
Standard....	1907	47.0	26.01	100.0	100.0	100.0	100.0	100.0	100.0	9.78
	1908	48.8	27.17	100.0	100.0	100.0	100.0	100.0	100.0	8.37
Abundance	1907	47.0	24.00	101.5	95.2	98.0	102.0	100.0	100.0	10.38
	1908	49.4	27.53	98.3	80.7	100.0	96.0	97.0	97.6	8.07
Alberta Red	1908	57.0	28.9	103.7	100.0	97.0	100.5	102.0	99.8	7.57
Amherst Isle............	1907	48.0	22.74	101.2	100.0	100.0	100.0	99.5	99.8	9.45
	1908	50.3	28.37	98.8	101.6	102.0	103.0	103.0	102.7	8.65
American Banner	1907	49.0	23.66	100.6	104.8	102.0	99.0	100.0	100.3	8.90
	1908	51.2	25.20	100.0	88.2	97.0	85.0	90.0	90.7	7.16
American Wonder.......	1907	46.0	23.8	98.3	99.4	97.0	99.0	95.0	97.0	9.68
	1908	50.6	24.07	99.4	90.3	97.0	90.0	98.0	95.0	7.69
Arctic Junior	1907	49.0	23.80	99.6	107.4	102.0	103.0	103.5	102.9	8.78
	1908	52.9	28.27	100.4	108.1	101.0	102.0	103.0	102.0	7.74
Auburn..	1907	50.0	26.0	102.1	110.2	99.5	100.0	95.0	98.2	8.09
	1908	51.2	27.0	101.4	108.1	102.0	104.0	104.0	103.3	7.35
Banatka...............	1907	51.0	28.47	100.6	106.6	104.0	99.0	100.0	101.0	9.57
	1908	54.7	29.13	100.0	111.8	100.0	101.0	104.0	101.6	6.47
Bald Pootung...........	1907	49.0	25.11	101.2	102.4	100.0	100.0	98.0	99.3	10.92
Bearded Pootung........	1907	50.0	27.57	100.6	106.0	102.0	102.5	104.0	103.8	8.85
	1908	56.2	27.04	101.2	94.6	101.0	100.0	100.0	100.3	7.58
Beardless Rural New Yorker	1907	48.0	24.42	100.0	97.0	100.0	100.5	100.0	100.2	9.55
	1908	50.9	24.81	100.2	91.9	99.0	100.0	99.0	99.3	7.43
Buda Pesth...........	1907	53.0	28.33	100.6	116.2	107.0	101.5	106.0	104.6	9.35
	1908	55.0	32.0	100.6	109.1	101.0	103.0	104.0	102.6	7.16
Bulgarian	1907	48.0	27.75	102.1	99.4	100.0	101.0	101.5	100.8	9.16
	1908	50.6	28.10	98.4	103.2	102.0	102.0	102.0	100.6	7.73
Clawson Longberry......	1907	49.0	26.40	100.6	91.0	96.0	98.0	96.0	96.7	9.25
	1908	53.2	26.90	100.6	89.2	98.0	97.0	95.0	96.6	10.96
Crimean Red............	1907	52.0	29.14	100.8	124.1	107.0	101.0	104.0	104.0	9.45
	1908	53.8	28.93	99.8	109.7	102.0	105.0	106.0	104.3	7.38
Dawson's Golden Chaff ..	1907	49.0	25.14	101.2	100.6	98.0	99.0	98.0	98.3	9.54
	1908	51.7	24.03	101.6	83.3	100.0	98.0	94.0	97.3	7.09
Economy	1907	48.0	25.66	99.4	106.6	102.0	99.0	97.0	99.3	9.87
	1908	51 7	27.43	98.8	103.8	102.0	103.0	104.0	103.0	7.40
Early Genesee Giant	1907	48.0	24.75	99.8	100.0	101.5	101.5	100.0	101.0	10 42
	1908	52.9	28.2	100.0	110.2	102.0	102.0	101.0	101.6	6.81
Early Ontario	1907	50.0	25.43	101.2	100 2	103.0	98.0	99.0	100.0	8.18
	1908	53.2	29.87	99.8	104.3	102.0	101.0	104.0	102.3	......

TABLE SHOWING RESULTS OF BAKING TESTS WITH ONTARIO WINTER WHEATS.—*Continued.*

Name of Variety.	Crop.	Present absorption.	Net gluten.	Yield of bread.	Size of loaf.	Appearance.	Color.	Texture.	Quality of loaf.	Moisture.
		%	%	%	%	%	%	%	%	%
Early Red Clawson......	1907	49.0	24.97	101.6	97.0	98.0	100.0	97.0	98.3	10.02
	1908	54.1	26.23	102.2	82.3	103.0	101.0	99.0	101.0	7.42
Early Red Chief..	1907	49.0	26.88	100.6	98.8	100.0	100.0	100.0	100.0	8.35
Egyptian Amber	1907	49.0	24.06	100.1	111.4	104.0	101.0	102.0	102.3	9.03
	1908	51.5	27.73	98.6	107.5	105.0	110.0	106.0	107.0	8.18
Extra Early Windsor ...	1907	48.0	....	98.5	95.6	98.5	100.0	96.0	98.2	9.19
	1908	48.8	24.17	99.2	85.5	100.0	85.0	93.0	92.6	7.25
Farmers' Friend	1908	52.9	27.20	99.8	105.9	100.5	100.5	102.0	101.0	7.00
Forty Fold.........	1907	49.0	24.06	100.6	93.4	95.0	99.0	95.0	96.3	8.36
	1908	50.6	24.73	100.6	82.3	100.0	95.0	93.0	96.0	7.36
Geneva................	1907	48.0	24.74	98.5	108.4	99.0	98.0	96.0	97.7	10.12
	1908	50.3	28.20	99.2	95.2	101.0	102.0	102.0	101.6	5.70
Genesee Reliable	1907	48.0	23.0	98.8	106.6	104.0	99.0	100.0	101.0	9.58
	1908	52.4	30.67	99.0	99.0	102.0	104.0	101.0	102.3	8.91
Ghirka	1907	50.0	26.74	101.5	112.0	102.0	100.5	105.0	102.5	9.32
	1908	50.3	27.57	98.4	103.8	102.0	102.0	103.0	102.3	......
Harvest King..	1907	49.0	23.0	100 0	109.0	102.0	98.5	95.0	98 5	9.58
	1908	50.9	26.67	100 8	87.1	102.0	102.5	100.0	101.5	7.40
Imperial Amber.........	1907	49.0	26.97	100.4	104.2	103.0	98.0	100.0	100.3	9.45
	1908	50.3	27.30	100.0	96.8	100.0	100.0	99.0	99.6	8.40
Iron Clad..............	1907	50.0	30.38	100.4	104.8	98.0	98.0	100.0	98.7	7.99
	1908	54.7	31.27	101.0	111.3	102.0	104.0	106.0	104.0	6.79
Kentucky Giant..	1907	50.0	26.09	100.4	107.2	101.0	101.0	102.0	101.3	10.16
	1908	52.4	28.47	100.7	111.8	101.0	101.0	104.0	102.0	7.72
Manitoba Red Fife	1907	49.0	26.73	100.2	120.4	103.0	100.5	101.0	101.5	9.33
	1908	50.3	29.60	99.6	94.6	100.0	99.0	101.0	100.0	7.64
Michigan Amber	1907	49.0	24.78	101.9	107.2	102.0	102.0	104.0	102.7	8.46
	1908	52.3	26.70	100.2	95.7	100.0	102.0	100.5	100.8	6.77
Mogul..................	1907	48.0	25.72	98.8	94.5	99.0	101.5	98.0	99.5	10.16
	1908	53.2	27.60	101.0	86.0	102.0	100.0	100.0	100.6	7.35
Monarch................	1907	51.0	25 65	101.6	103.6	102.0	99.0	102.5	101.2	9.27
	1908	49.7	28.43	99.4	93.0	103.0	103.0	103.0	103.0	8.46
McGarvin	1907	47.0	25.29	98.3	95.9	100.0	100.5	99.0	99.8	10.82
	1908	50.6	28.17	99.4	100.0	100.5	100.0	102.0	100.8	7.34
McPherson	1907	50.0	25.74	102.1	112.0	104.0	102.0	101.0	102.3	8.62
	1908	53.2	30.30	100.2	104.3	100.5	100.0	104.0	101.5	8.23
New Mammoth Amber...	1907	48.0	24.39	100 0	101.2	101.0	101.0	100.0	100.7	9.57
	1908	48.8	27.00	97.7	91.9	105.0	104.0	100.0	103.0	8.56

Table Showing Results of Baking Tests with Ontario Winter Wheats.—*Continued.*

Name of Variety.	Crop.	Present absorption.	Net gluten.	Yield of bread.	Size of loaf.	Appearance.	Color.	Texture.	Quality of loaf.	Moisture.
		%	%	%	%	%	%	%	%	%
Never Kill	1907	48.0	25.92	98.5	94.5	99.5	98.0	96.0	97.8	9.95
	1908	49.7	26.23	97.7	99.5	100.0	100.0	102.0	100.6	7.09
New Invincible	1907	49.0	25.15	99.6	100.6	100.0	101.0	101.0	100.7	9.38
	1908	49.7	27.03	96.7	96.2	102.0	100.0	100.0	100.6	6.11
New Paris Prize	1907	48.0	23.34	99.6	98.8	98.0	100.0	98.0	98.7	9.62
	1908	49.7	24.07	99.2	83.9	101.0	96.0	94.0	97.0	8.76
Nigger Wheat	1907	49.0	27.66	100.0	99.3	100.0	102.0	105.0	102.3	10.42
	1908	52.6	28.17	101.4	102.7	101.0	100.5	102.0	101.2	7.61
No. 5 Red Wheat	1907	49.0	24.55	101.9	88.0	98.0	99.5	97.0	98.2	10.49
	1908	51.8	30.07	99.4	95.2	99.0	100.0	100.0	99.6	9.06
No. 8 Red Wheat	1907	50.0	23.07	101.7	99.4	97.0	99.5	96.0	96.8	9.75
	1908	50.0	26.83	99.6	80.7	99.0	97.0	95.0	97.0	8.27
Northwester	1907	48.0	25.01	99.8	100.0	96.0	100.0	97.0	97.3	9.96
	1908	49.7	26.04	99.6	92.5	103.0	105.0	100.0	102.6	8.12
New Perfection	1908	50.3	29.42	98.4	97.8	103.0	106.0	104.0	104.3	8.12
Onigara	1907	49.0	26.06	100.4	106.0	102.0	102.0	102.0	102.0	9.63
	1908	53.2	28.73	100.4	98.4	96.0	98.0	104.0	99.3	7.34
Padin	1907	48.0	24.42	99.8	104.9	100.0	98.5	99.5	99.3	9.87
	1908	48.8	30.43	96.5	105.9	99.0	100.0	103.0	100.6	6.16
Paramount	1907	48.0	25.08	99.6	105.4	103.0	103.0	104.0	103.3	10.32
	1908	52.3	28.30	99.2	91.4	102.0	100.0	100.0	100.6	8.45
Plymouth	1908	50.3	23.57	98.6	83.3	100.0	96.0	90.0	95.3	8.19
Prize Taker	1907	48.0	21.71	98.8	93.3	96.5	98.0	96.0	96.8	8.82
	1908	53.2	24.53	102.5	83.3	100.0	100.0	97.0	99.0	6.72
Prosperity	1907	49.0	24.81	98.5	97.6	97.0	98.0	98.0	97.3	8.66
	1908	49.7	26.10	97.3	88.7	100.0	100.0	100.0	100.0	5.39
Red Hussar	1907	48.0	22.62	97.7	91.5	97.0	101.0	94.0	97.3	8.13
	1908	50.6	26.23	97.5	87.6	100.5	95.0	85.0	93.5	8.65
Red Wave	1907	49.0	21.48	101.7	91.0	95.0	101.0	96.0	97.3	8.69
	1908	49.4	25.20	99.4	83.9	100.0	95.0	97.0	97.3	7.59
Royalty	1907	47.0	23.88	99.6	104.9	98.0	100.0	98.0	98.7	10.46
	1908	52.6	26.43	100.8	97.8	100.0	100.0	101.0	100.3	8.04
Rudy	1907	48.0	24.33	98.5	115.6	103.0	100.0	102.0	102.0	10.32
	1908	51.5	31.27	98.9	102.1	101.5	104.0	103.5	103.0	7.38
Russian Amber	1907	48.0	23.19	100.6	98.8	101.0	101.5	100.0	100.8	10.51
	1908	53.2	29.97	100.0	95.2	102.0	101.5	101.0	101.5	8.32
Scott	1907	49.0	26.97	102.1	109.7	102.0	101.0	104.0	102.3	9.36
	1908	54.4	31.40	100.2	109.7	100.0	102.0	104.0	102.0	7.18

TABLE SHOWING RESULTS OF BAKING TESTS WITH ONTARIO WINTER WHEATS.—*Concluded.*

Name of Variety.	Crop.	Present absorption.	Net gluten.	Yield of bread.	Size of loaf.	Appearance.	Color.	Texture.	Quality of loaf.	Moisture.
		%	%	%	%	%	%	%	%	%
Silver Dollar	1907	48.0	23.55	98.3	98.8	101.0	102.0	102.0	101.7	10.36
Silver Queen	1908	50.3	28.60	100.2	80.1	101.0	98.5	100.0	99.8	6.97
Silver Sheaf Longberry	1907	49.0	25.26	99.6	93.0	98.0	96.0	97.0	97.0	9.32
Superlative	1907	......	22.69	......	......	......	......	......	......	9.61
	1908	51.8	24.00	100.8	83.9	102.0	101.0	97.0	100.0	7.48
Tasmania Red	1907	52.0	28.44	102.9	112.0	103.0	100.0	96.0	99.7	8.18
	1908	53.2	28.67	100.6	105.4	101.0	105.0	102.0	102.6	9.05
Treadwell	1907	49.0	25.06	98.5	113.2	101.0	100.0	100.0	100.3	9.27
	1908	54.7	27.33	101.7	106.9	100.0	85.0	100.0	95.0	8.49
Turkey Red	1907	49.0	23.04	101.9	107.2	100.0	100.0	100.0	100.0	9.96
	1908	53.2	29.87	99.4	105.9	101.0	102.0	103.0	102.0	7.05
Tuscan Isle	1907	50.0	27.75	100.4	120.4	106.0	96.0	101.0	101.0	9.67
	1908	53.2	30.87	99.4	106.4	101.0	102.0	102.0	101.6	7.70
Yarsolaf	1907	50.0	28.49	100.4	109.7	105.0	94.0	102.0	100.3	9.21
	1908	52.3	28.17	99.8	108.1	100.0	103.5	104.0	102.5	7.31
Yenide	1907	48.0	25.50	100.4	105.4	98.0	100.0	94.0	97.3	9.78
	1908	50.6	29.57	100.8	107.5	101.0	99.0	100.0	100.0	7.75

Reference to the last column shows that the samples of flour from the 1908 crop were much drier than those of the previous year. This may be due to peculiarity of the season, but it is more probably a result of the flour drying out in the laboratory. The low per cent. of moisture would naturally increase the water-absorptive power of the flour, and, to some extent, the percentage of gluten and the yield of bread, but it would not affect the volume of loaf nor the quality of the bread. In view of the above remarks, we cannot say that the crop of 1908 is very much, if any, superior to that of 1907 in water absorption, gluten and yield of bread, while in most cases the volume of the loaf obtained is less, and the quality of bread is inferior. The latter point is best seen in the second last column, which gives the average quality of the bread. But, while there is this general falling off in quality, the varieties that gave the best results in the baking trials with the 1907 crop are found to be best in the crop of 1908. In this way the work of one year confirms that of the other.

THE INFLUENCE OF AGEING WHEAT AND FLOUR. The effect of age in wheat and flour was also tested again this year, but with a smaller number of varieties. The milling of the wheat for these tests was not done until September of this year, consequently, the wheat was about nine months older than when the previous samples were tested. The results of the baking tests are given in the following table:

TABLE SHOWING THE INFLUENCE OF AGE ON THE BAKING QUALITY OF FLOUR.

Name of Variety.	Baking.	Gluten.	Absorption, c.c.	Yield of Bread, grams.	Size of Loaf, c.c.	Appearance.	Color.	Texture.	Quality of Loaf.	Moisture.
		%	%			%	%	%	%	%
Standard	1st	27.17	48.7	486	1,860	100.0	100.0	100.0	100.0	8.37
	2nd	26.37	47.6	480	2,030	100.0	100.0	100.0	100.0	......
Kentucky Giant	1st	28.47	52.3	489	2,080	101.0	101.0	104.0	102.0	7.72
	2nd	27.17	47.6	475	2,010	101.0	103.0	105.0	103.0	......
Early Genesee Giant	1st	28.20	52.9	486	2,050	102.0	102.0	101.0	101.6	6.81
	2nd	27.73	47.6	472	2,040	102.0	104.0	102.0	102.6	......
Dawson's Golden Chaff	1st	24.03	51.8	494	1,550	100.0	98.0	94.0	97.3	7.09
	2nd	23.03	47.6	475	1,770	95.0	104.0	100.0	98.3	......
McPherson	1st	30.30	53.2	487	1,940	100.5	100.0	104.0	101.5	8.23
	2nd	27.67	47.6	480	2,020	106.0	105.0	110.0	107.0	.....
Treadwell	1st	27.33	54.7	494	1,990	100.0	85.0	100.0	95.0	8.49
	2nd	24.73	47.6	474	2,200	100.0	102.0	98.0	100.0	......
Tuscan Isle	1st	30.87	53.2	483	1,980	101.0	102.0	102.0	101.6	7.70
	2nd	27.77	51.8	472	2,130	103.0	105.0	108.0	105.3	......
Geneva	1st	28.20	50.3	482	1,770	101.0	102.0	102.0	101.6	5.70
	2nd	27.13	50.6	475	2,130	103.0	100.5	103.0	102.1	......
Bulgarian	1st	28.10	50.6	478	1,940	102.0	102.0	103.0	102.3	7.73
	2nd	26.20	50.0	474	2,200	102.0	102.0	103.0	102.3	......
Turkey Red	1st	29.87	53.2	483	1,970	101.0	102.0	103.0	102.0	7.05
	2nd	27.10	49.4	469	2,150	104.0	104.5	108.0	105.5	......
Egyptian Amber	1st	27.73	51.4	479	2,000	105.0	110.0	106.0	107.0	8.18
	2nd	27.87	48.7	470	1,980	104.0	104.0	106.0	104.6	......
Rudy	1st	31.27	51.4	481	1,900	101.5	104.0	103.5	103.0	7.38
	2nd	28.73	49.1	471	2,180	106.0	106.0	107.0	106.3	......
Russian Amber	1st	29.97	53.2	486	1,770	102.0	101.5	101.0	101.5	8.32
	2nd	27.80	47.6	468	2,030	105.0	106.0	104.0	105.0	......
Early Red Clawson	1st	26.23	54.1	497	1,530	103.0	101.0	99.0	104.3	7.42
	2nd	25.37	44.9	468	1,680	94.0	103.0	95.0	97.3	......
Imperial Amber	1st	27.30	50.3	480	1,800	100.0	100.0	99.0	99.6	8.40
	2nd	25.67	47.6	480	2,050	104.0	105.0	104.0	104.3	......

It will be noticed that the per cent. of wet gluten in the flour is in nearly every case lower at the time of the second baking than it was in the first. This corresponds with all our previous work, as we have always found that the flour from new wheat gives a higher percentage of gluten than it will after some months of ageing. The water absorption is also lower. This is probably due to the fact that the flour used in the first baking stood in the laboratory from January to March, when the building was heated, and, consequently, dried out very much. The low percentage of moisture given in the last column confirms this conclusion. The second baking was made in September at the close of the summer season. No determination of the water content of the flour was made then, but it probably was much higher than in the spring. But, while the percentage of gluten and water absorption is lower, the volume of the loaf and the quality of the bread obtained in the second baking was much superior to that of the first test. It should be pointed out that the flour used as the standard in the two bakings was the same. The volume given in both bakings is the actual volume obtained, but as the standard had improved in quality with ageing, the figures for color, texture and appearance do not show the full improvement of the wheat and flour. Unfortunately, we have no way of illustrating this change, but it is evident that in nearly every case the volume of the loaf was very much increased and that the improvement in quality of bread from the various flours experimented with was equal to or better than that of the standard.

BLENDING OF SOFT AND HARD WHEATS. It is a well known fact that our soft Ontario winter wheats do not produce a flour that will make as large or as fine appearing a loaf of bread as the hard spring wheats. The soft winter wheat flour has not sufficient gluten to produce a large, well-raised loaf of bread, and the texture is usually comparatively poor. On the other hand, the strong flour from the Manitoba spring wheat yields a large loaf of good texture, but the bread is somewhat lacking in flavor. The blending of the two flours imparts to the bread some of the desired qualities of both and the result is the production of a loaf of bread that, while not so large as that made entirely from the hard wheat flour, is of good texture and flavor. Further encouragement is given to the use of blended flour by reason of the evident demand of the market for less volume of loaf and that more attention be paid to questions of texture and flavor of the bread. We have done what we could to demonstrate the value of these blended flours, and thus encourage the use of our home grown wheat. It is worthy of note that this year all the old Ontario wheat was used up long before the new crop was available.

THE INFLUENCE OF CHEMICALS USED IN FUMIGATING MILLS ON WHEAT AND FLOUR. The materials used in our work were hydrocyanic acid obtained from potassium cyanide and sulphuric acid, carbon disulphide and sulphur fumes. The investigation is not completed, but the indications are that the hydrocyanic acid does little or no harm to flour, while sulphur fumes totally destroyed it for baking purposes. Carbon disulphide spoiled the flour for immediate use, but on exposure for some months it regained its original quality.

THE INFLUENCE OF THE STAGE OF MATURITY AT WHICH WHEAT IS CUT ON THE BAKING QUALITIES OF THE FLOUR is also under investigation, but we do not feel in a position to state the results as yet.

THE INFLUENCE OF BLEACHING ON THE BAKING QUALITIES OF FLOUR. This is becoming a live question and one that must receive full attention in the near future. The Alsop Process Company of Canada have very kindly placed a machine at our disposal in order that we might have every facility for making a full study of the whole subject. This we hope to do during the coming season.

INSECTICIDES AND FUNGICIDES.

Each year a number of these materials are sent to us for analysis. This year we have analyzed a larger number than usual on account of the fact that we made a study of the lime-sulphur washes the past summer and personally collected 33 samples of these substances. Of the 62 samples of insecticides and fungicides analyzed, 42 were lime-sulphur washes. The rest consisted of Paris green (7), white arsenic (4), lead arsenate (5), sodium arsenate (1), copper sulphate (1), formaldehyde (1), and Bordeaux paste (1),

Mr. Fulmer has prepared the following notes on insecticides and fungicides:

Lime-sulphur Washes.

As the results of our work on these washes are being published in Bulletin No. 177, only a brief summary of it will here be given in which only the more salient points will be mentioned. The investigation was undertaken mainly because of the lack of definite information concerning the composition of these materials. The need for such knowledge has been much emphasized since the introduction of the so-called commercial Lime-sulphur washes. Without a knowledge of the composition of the home-made washes it is impossible to form a just estimate of the value of the commercial stuffs, outside of actual spraying experiments. Composition of any substance also gives ground for criticism and opportunity to suggest lines of improvement in its manufacture and application.

Home-made Washes. Twenty-four samples of home-made washes were collected in the Niagara fruit district and analyzed. Data collected concerning them reveal a great variety of methods for their manufacture, a large number of different formulae, and a marked difference in the strength at which they are sprayed. The amounts of lime in the formulæ vary from 16 to 24 pounds, and of the sulphur from 15 to 19 pounds, to 40 gallons of water. The favorite formula in vogue is the old 20-15-40 one, but the tendency seems to be to slightly increase the proportion of sulphur, and, in most cases, the amount. The reason for this last is not apparent, for there is no doubt but that the efficiency of the wash made from the old formula, if boiling be properly carried on, is entirely ample and quite possibly more than ample.

The analyses show that the liquid part of the wash is made up of the following compounds: Calcium sulphide, calcium thiosulphate, calcium sulphite and calcium sulphate. The amounts of sulphur in the form of these different substances varied within the following limits in the 24 home-made washes analyzed, (pounds per 40 gallons of spray): As calcium sulphide, 6.29 to 13.28 lbs.; as calcium thiosulphate and sulphite combined, 1.96 to 4.20 lbs.; and as calcium sulphate, .09 to 1.70 lbs. The average amounts of the sulphur in these different forms were 10.41, 3.11 and .37 lbs., respectively. The total sulphur in solution ranged from 8.51 to 17.40 lbs. per 40 gallons, and averaged 13.89 pounds; the total lime in solution ranged from 5.49 to 10.72 pounds per 40 gallons, and averaged 8.49 pounds. The ratio between total lime and total sulphur in solution ranged from 1:1.41 to 1:1.89; and the percentage of the total sulphur in the calcium sulphide form ranged from 68.3 to 80.3.

The residue or "mud" present in the wash consists of lime, and very small amounts of free and combined sulphur, together with such substances as iron, aluminum, silica, and magnesia, and other impurities in the lime used. The total amount of lime and free sulphur left in the residue will depend on the formula used, the quality of the lime used and the thoroughness with which the wash has been boiled. A large excess of lime over sulphur in the formula will leave a large amount of lime in the residue, especially if the lime be of high quality; and a poorly boiled wash will have a large amount of free sulphur in the residue, and therefore other factors being equal, a correspondingly higher amount of free lime.

The value of free lime in a wash is low, especially all over a limited amount, an amount enough to whitewash the tree and improve the sticking qualities of the spray; and free sulphur is no more valuable than sulphur merely mixed with water and sprayed.

The valuable constituent of the wash is calcium sulphide, and the value is also considerably augmented by the presence of the thiosulphate and the sulphite. On the basis of the amount of these constituents present must the value of a wash be estimated, if only its composition be known. A wash is deemed especially active if it be high in calcium sulphide sulphur, and of two washes the one containing the greater amount of this compound per unit volume is the stronger. It will thus appear, according to the limits mentioned above regarding the composition of the home-made washes, that there is a great latitude in the strength of the wash as being used in the Niagara district, some washes being more than twice as strong as others. Every sprayer claims to be obtaining excellent results from his own wash, however, and for this reason it is impossible to settle on what strength should be the standard one. It would seem, of course, that the lower limit could be selected as a standard if it be producing results for those men who are using washes corresponding to it. But so much depends on degree of infestation, thoroughness of application, season, etc., that a recommendation of such a standard would not be advisable. There is great need for some work to be carried on in order to settle on the proper strength of wash that should be employed.

A very interesting fact brought out by the analyses of the home-made washes is that of the total independence of the strength of the wash upon the formula used. Although it is true that, other factors being alike, the strongest wash will be prepared from that formula containing the most sulphur, yet under the present status of knowledge among orchardists relating to the preparing of the wash, it is not the amount of sulphur, but the thoroughness of boiling that determines the quality of the wash. The following selected analyses of a number of the analyzed washes will illustrate this:

Sample No.	Formula.			Time boiled.	Total S. in solution. Lbs. per 40 gals.	Sulphide S. in solution. Lbs. per 40 gals.	Thiosulphate and Sulphite S. in solution. Lbs. per 40 gals.	Sulphate S. in solution. Lbs. per 40 gals.
	Lime lbs.	Sulphur lbs.	Volume gals.					
130....	20	16	40	40 min.	14.45	10.85	3.23	0.37
132....	20	16	40	1 hr.	11.55	8.46	2.72	0.37
135....	20	16	40	¾-1 hr.	15.90	12.22	3.05	0.63
133....	20	15	40	1 hr.	13.30	9.08	2.46	1.76
137....	20	15	40	1 hr.	14.30	11.48	2.59	0.23
146....	20	15	40	1 hr.	10.49	7.82	2.56	0.11
152....	22	18	40	*	17.40	13.14	3.90	0.36
153 b..	22	18	40	50 min.	15.64	11.91	3.59	0.14

* Until green color develops.

Examining the above figures it will be seen that it is not the formula which furnishes the most sulphur that produces a wash with the largest amount of soluble sulphur compounds; neither do the same formulae produce washes of equal strength. The factor which here introduces itself is the rate or thoroughness of boiling.

Weak, slow boiling, no matter whether it be by steam or direct heat, will produce a correspondingly weak wash no matter how much lime or how much sulphur be used. It is without doubt that to this factor of incomplete, unthorough boiling, can be attributed most of the conflicting views held regarding proper formulae and methods of boiling, etc.

Boil vigorously and any of the recognized formulae will produce excellent washes.

COMMERCIAL WASHES. The commercial brands of Lime-sulphur washes are now becoming quite common and are giving excellent results wherever used. They are an especially convenient form of the wash for summer spraying work.

When these washes were first introduced, fruit growers were naturally dubious as to their usefulness, and as to whether they would be safe to apply or not. But it was soon found that their action was similar to that of the home-made washes, showing that they were likely similar in nature, composition and source.

We have analyzed seven samples of these materials, representing the Vanco, Grasselli, Rex, Sherwin-Williams, and Niagara brands. They are all clear solutions, except the Niagara, which contains the "mud." In composition and strength they are much alike, but some brands are not so uniform in strength as they should be. Their analyses show them to contain the same constituents as do the home-made washes, but they range from 8 to 10 times or more stronger than do the home-made ones. Further, which is an important fact, they do not form crystals on standing if kept protected from the air. They do form crystals, however, when lime is added to them, just as do the home-made washes, and this must be borne in mind when handling them. If lime be used with them, it should be put in only just before spraying and after the water is added.

One of the greatest difficulties in using the commercial brands is to know how much water to add. The manufacturers recommend the addition of such and such a quantity of water, but such an amount may be over or under the amount necessary. A chemical analysis of the wash would show how much dilution would be required, but such a method would be very inconvenient. A more ready means is needed. Dilution on the basis of the specific gravity forms a very ready and quite an accurate method, and one which can be highly recommended. Suitable hydrometers, those made for heavy liquids, and ranging from 1,000 to 1,400 on the graduated scale, can be secured for 75c. to $1, from any firm dealing in supplies of that kind.

When the specific gravity is known, the number of gallons of winter spray which one gallon of the concentrate will make can be determined by dividing the decimal part of the reading by .028. Thus, one gallon of a commercial brand having a sp. gr. of 1.28 will make $\frac{.28}{.028}=10$ gallons of spray, *i.e.,* each gallon of concentrate will require 9 gallons of water.

HOME-MADE CONCENTRATES. With the increasing favor of the commercial brands, or concentrated Lime-sulphur solutions, the question naturally suggests itself: Is it possible to make such solutions on the farm? If they can be made they will no doubt displace the commercial stuffs to a great extent, because of less cost.

From the work which we have done here, we have found that a home-made concentrate can be successfully made, and of such a nature as to compare favorably in every way with the commercial articles.

Full directions for preparing and handling these concentrates will be found in the bulletin on Lime-sulphur Washes.

PARIS GREEN.

This substance still forms a popular and standard arsenical for combating biting insects. Seven samples were received and analyzed for total arsenic:

Sample No.	Total Arsenic as As_2O_3 %	Sample No.	Total Arsenic as As_2O_3 %
36	57.32	76	58.37
43	57.29	77	57.67
52	57.44	108	50.2
73	56.16		

Pure Paris Green is known as copper acetoarsenite and contains 58.65 per cent. As_2O_3. But owing to impurities not entirely removed in manufacture, it usually falls slightly below this figure. A good, well-made green, however, should not fall below 56.0 per cent. If an analysis shows less than this amount, either adulteration has been practised or the Green has been carelessly manufactured. Only one sample, No. 108, in the above list is of doubtful quality; all the others are genuine.

WHITE ARSENIC AND SODIUM ARSENATE.

These two substances are used for making the home-made arsenite and arsenate, respectively, of calcium or lead. Their usefulness for this purpose depends on their purity, especially when the person using them is only able to follow the directions given in the various stated formulæ.

The four samples of white arsenic were of splendid quality, only one falling below 100 per cent. purity. This one was 97.36 per cent. pure.

The sample of sodium arsenate was also of a very high quality, practically 100 per cent. $Na_2HAsO_4 . 7H_2O$.

LEAD ARSENATE.

This arsenical is now becoming very popular and is replacing Paris green to quite an extent. This is because it is always absolutely safe to apply even on the tenderest of foliage, which is not by any means true of Paris green; and, further, because of the facts that it stays well suspended in water on account of its extremely fine division, and that it adheres firmly to the bark or foliage, and therefore exerts its influence over a long period of time.

Lead arsenate can be manufactured very conveniently and cheaply on the farm from sodium arsenate and lead acetate, (see Bulletin No. 154, p. 12, Ont. Dept. of Agri.); but at the present time the most of that used is bought ready prepared. Several brands are on the market, most of them in what is known as paste form. We received one sample this year, however, which was in liquid form, more nearly in a condition for spraying than the pastes, but of course much lower in arsenic than the latter. The pastes are usually sold on the basis of 40 per cent. of moisture, in which case they should contain about 15.0 per cent. of As_2O_5. If a greater moisture content is possessed, then a proportionately larger quantity is or should be given for the same money, and a correspondingly greater quantity must also be used for spraying.

The following table shows the analysis of the samples which we received:

Sample No.	Form.	Per cent. moisture.	Per cent, $As_2 O_5$	Per cent, $As_2 O_5$ on 40 per cent. moisture basis.
45	paste,	42.13	15.57	16.39
88	paste,	54.39	10.23	13.91
109	paste,	48.18	9.74	11.73
150	paste,	31.05	14.9	11.56
152	liquid,	.....	3.4	......

It will be seen that the samples are not at all uniform in composition and that the most of them run low in arsenic.

Bordeaux Paste.

This substance is merely the ordinary Bordeaux Mixture from which the excess of moisture has been removed. It, as a fungicide, is made on the same principle as the Lead Arsenate paste, an insecticide. By the addition of water a spray of any desired strength can be made from it.

The sample which we analyzed contained 6.42 per cent. of Copper oxide, CuO, an amount which is equal to 20.23 per cent. crystallized copper sulphate or bluestone ($CuSO_4 . 5H_2O$).

According to the recognized formula:

4 pounds bluestone,
4 pounds lime,
40 gallons water,

for Bordeaux Mixture, one pound of this paste would be enough to make 2.02 gallons of spray of equal strength. The paste also contains the lime, so it is equal in every way to the ordinary home-made Bordeaux, provided its flocculent condition be not destroyed in any way so that it will remain suspended in water to the same degree as the home-made does.

The following figures show the composition of the one sample analyzed:

Copper oxide (CuO), 6.42%=20.23% $CuSO_4$ $5H_2O$.

Lime (CaO), 19.85%.

DAIRY EXPERIMENTS.

Losses in Making Cheese from Normal and Over-ripe Milk.

It has been known for a long time that milk received at the factory in the slightly sour or over-ripe condition would not produce so many pounds of cheese as milk received in the sweet or normal condition. During the past season we tried to get some data showing the amount of these losses and of what they consist.

One of the chief difficulties in the work is to secure representative samples and accurate weights of the milk and cheese. Because of this difficulty we first studied the loss of total solids and protein in the whey from normal and over-ripe milk used in the manufacture of cheese in the small vats of the Experimental Dairy

Department. It was claimed, however, that the conditions were not comparable with those found in the large vats in actual factory practice. This year, after consultation with Mr. F. Herns, Chief Dairy Inspector, and his assistant inspectors, we decided that as it was impossible to collect and weigh the whey from the large vats in use in the factories, we would study the matter from the standpoint of the protein and fat recovered in the cheese.

With this end in view, arrangements were made with seven cheesemakers who were recommended as painstaking and accurate, to co-operate in this work. The factories were visited and the work talked over with the men, and the following sheet of instructions supplied. Sheets for recording required data were also furnished, and bottles for the samples.

Sheet of Instructions.

Weigh accurately in a vat milk which you consider will be fast working (over-ripe). Mix the contents of the vat thoroughly by means of the agitators and then determine the acidity of the milk with the acidimeter; and also at this stage take a sample of the milk in the small narrow-necked sample bottle supplied. Now proceed in the ordinary way for setting, dipping, milling, etc., being careful, however, to keep the curd of this vat entirely separate from that of any other vat. In order that the vat will make an even number of cheese of your ordinary size make, take the quantity of milk which you find by experience will give the proper quantity of curd. This is very necessary since it is essential that the weight of all the cheese made from this vat be determined.

When the cheese come from the press the following morning weigh them accurately, and then sample them at once by withdrawing a small plug from each by means of the trier. Place the plugs in the wide-mouthed sample bottle supplied and screw the cap on tightly.

Mail the samples to us as soon as possible after obtained. In order that the milk sample shall reach us in a sweet condition, 3 or 4 drops of the formaldehyde which we furnish is to be dropped into the sample as soon as taken and mixed with it. The cheese need not be preserved in this way.

This experiment should be carried through six times, if possible; and, in order to obtain comparative data, six experiments wherein normal working milk is used instead of over-ripe milk, must be conducted. It is not essential that these experiments be carried out the same day as those with the over-ripe milk, but, if it is possible to do so, it would be as well. This will make a total of twelve experiments in all. Your own convenience must be consulted, however, as to the number of experiments which you run through.

All data are to be recorded on the sheets furnished for that purpose, and sent to us as indicated.

Please number the samples of milk from one up, irrespective of whether it is normal or over-ripe milk, and give the cheese sample the same number as the milk from which it is made.

A total of 52 samples of milk and cheese were received, 10 of normal milk, 10 of cheese from normal milk, 13 of over-ripe milk, and 13 of cheese from over-ripe milk. The per cent. of protein and fat in the milk and cheese was determined, and from these percentages and the weight of milk and cheese supplied, we calculated the total weight of protein and fat. The difference between the weight of these constituents found in the milk and recovered in the cheese represents the weight of protein and fat lost in the whey. The results obtained were not uniform. In some cases the loss of protein and fat from the over-ripe milk was greater than from the normal, and sometimes the reverse was true. The variation was greater in the case of the fat than the protein, but in nearly every instance the difference between the losses from normal and over-ripe milk were very small.

The average losses of protein and fat per 100 pounds of normal and over-ripe milk and the weight of cheese made per 100 pounds of milk are given in the following table:

Kind of Milk.	No. of Samples.	Protein. lbs.	Fat. lbs.	Cheese. lbs.
Normal........................	10	.735	.338	9.17
Over-ripe	13	.778	.337	8.31

The last column of the table shows that 100 pounds of over-ripe milk produced 86 pounds less cheese than the normal milk, yet there was apparently approximately as much protein and fat recovered with one kind of milk as with the other. In our previous study of the question, where the loss of solids in the whey was determined directly, there was practically no difference in the amount of solids lost in making cheese from the normal and over-ripe milk. Apparently, then, both methods of studying the subject point to the same conclusion, namely, that the loss of solids is no greater in making cheese from over-ripe milk than from normal milk. Yet, the above table shows that there is nearly one pound less cheese made from 100 pounds of one kind of milk than from the other. Unfortunately, when studying the loss of solids, we did not determine the moisture content of the cheese. It is possible that the difference is due to the over-ripe milk producing a dryer curd and cheese.

We did not receive as many samples of milk and cheese as we expected, and, while the results obtained corroborate the results of previous work, we feel that more time will have to be given to this subject next season, including a study of the moisture content of the cheese, before we are in a position to draw definite conclusions regarding the matter.

WHEY BUTTER. Several samples of whey butter were analyzed in the ordinary way, and also to determine if there was any change in the nature of the fats, but, so far as the work was continued, no difference was found between whey butter and the ordinary butter.

ACKNOWLEDGMENTS.

In conclusion, I beg gratefully to acknowledge the loyal assistance of all those associated with me in the work of the department of Chemistry, and the hearty co-operation of the various College departments in carrying out of our work during the past year.

Respectfully submitted,

R. HARCOURT.

PART VII.

THE PROFESSOR OF SOIL CHEMISTRY AND LECTURER IN GEOLOGY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith my annual report for the year 1909.

The nature and scope of the work in Soil Chemistry, Inorganic Chemistry and Geology, is indicated by the College Calendar and requires no extended notice here. Since August 1st, Mr. A. E. Slater has shared the work with me, and the ground has been covered as fully as the time allotted to these subjects permits, though more time could be used to advantage in some branches. I might also add that a series of lectures were delivered in Elementary Agricultural Chemistry, embracing a study of soils, fertilizers and crops, and also a series of lectures to the Horticultural students of the Short Course, on the function and uses of fertilizers.

INVESTIGATIONS.

During the past year we have conducted experiments along several lines, which we may enumerate briefly as follows:

First, the chemical composition of certain type soils; second, the economic use and application of commercial fertilizers; third, the power of legumes to fix atmospheric nitrogen; fourth, the examination and hygienic improvement of water supplies from various sources. Further, we have also examined and reported on much miscellaneous material, such as suitability of rock for road building, also the economic value of certain minerals submitted for analysis. In connection with our mineralogical work, it may be stated here that a large and valuable addition of minerals has been added to our museum and laboratory collections, for the use of students. In view of the importance of this branch, which will be mentioned later, I would request that a liberal appropriation be made for the necessary materials to carry on this work.

SOIL INVESTIGATION.

The work in soil investigation covers so wide a field, and introduces problems of so intricate and complex a character, that it necessitates the most continuous and careful work. While we have not been able to make a complete soil survey of the Province of Ontario, the importance of the work cannot be overestimated. In proof of this it might be stated that only this year the State of Illinois has made an annual grant of $60,000 for soil survey work alone. Soil examination in Ontario offers even greater problems than does that of the State of Illinois, because of the immense diversity of our soil types. But if this Station is to help the farmers in solving certain difficulties, which will be mentioned later, it will necessitate more funds and more labor from year to year.

This year we have been called upon to examine and suggest remedies for alkaline soils, acid soils, barren spots bare of all growth, unfertile soils yielding but poor crops, and soils suffering from toxic materials and plant poisons.

ACID SOILS.

In conection with our work on acid soils, it may be stated that much has been done. This work, however, has been carefully put together in bulletin form, which is now in the printer's hands, and, therefore, will not be discussed here. The problem in connection with these soils and their crop producing powers is a most intricate one, but one of much practical importance in this Province.

ALKALINE SOILS.

While alkaline soils are not common in the Province of Ontario, several samples have been submitted to us this year for examination. In most cases, however, the alkali substance has been that known as white alkali (sodium sulphate) and not the more injurious black alkali (sodium carbonate). In both cases, however, the evil must be removed before satisfactory crops can be raised. The process consists in:

1. Reducing surface evaporation to the lowest possible point.
2. Neutralizing corrosive salts by chemical antidotes.
3. Introducing drainage and leaching by underdrainage and flooding.

Frequent and deep tillage will tend to prevent surface evaporation; also the growth of root crops, which absorb a large quantity of soluble salts, so that cereals may be grown the second or third season. Underdrainage will lower the water table and carry off the injurious materials. Black alkali can be corrected by the addition of gypsum (calcium sulphate), about 500 to 1000 pounds per acre, followed by small annual dressings.

Samples of soil in ever increasing numbers are being submitted to us for examination. While little is to be gained by the complete analysis of individual and isolated samples, the analysis of certain fixed types of soil is of considerable value, and this we endeavor to do as far as possible. Soils are also examined for certain fertilizing constituents, or for the presence of injurious plant poisons, or other causes through which barrenness and unfertility may result.

WORK WITH FERTILIZERS.

With the ever-increasing use of fertilizers throughout the Province, the question of their economic use and application is one of deep significance. Though as yet they are not as widely used as in the States, yet we believe the time is surely coming when they will constitute a very prominent and necessary feature of farm methods. The fertility of our richest soils must of necessity be depleted by continuous cropping, unless the fertilizing materials be returned to the soil. Continuous grain raising, unless stock be kept, cannot be followed for years without the liberal application of commercial fertilizers.

Because of the crowded nature of the farm land, and lack of help, it has been impossible to conduct a series of fertilizing plots here, under my own supervision. Such work would be of the highest value to the practical agriculturist. To insure accurate work with fertilizers, one on which to base conclusions, it is desirable to have the conditions as uniform as possible and to carry them out on the same plots for a number of years with different crops. I, however, planned a series of fertilizer experiments for co-operative work amongst our farmers. Much information of a valuable nature has been secured, a full account of which is to be found in the Annual Report of the Experimental Union for this year.

I would like to impress here the value to the farmer of conducting a series of simple fertilizer experiments on his own farm. Such an experiment will give him more knowledge and a far better idea as to the requirements of his soil than any complete soil analysis can furnish him with. The following plan for experiments with fertilizers has given good results. A series of plots of as uniform a nature as possible, 2 rods by 2 rods, which is 1-40 of an acre, treated as follows:

Plot No. 1.	No fertilizer.		
" 2.	Superphosphate,	400-500	lbs. per acre.
	Potassium sulphate,	120-160	" "
	Sodium nitrate,	120-160	" "
" 3.	Potassium sulphate,	120-160	" "
	Sodium nitrate	120-160	" "
" 4.	Potassium sulphate,	120-160	" "
	Superphosphate,	400-500	" "
" 5.	Sodium nitrate,	120	" "
	Superphosphate,	400-500	" "

If corn is the crop experimented with, it might be as well to increase the size of these plots to 1-20 or even to 1-10 of an acre.

APPLICATION OF FERTILIZERS.

The application of the Potash and Superphosphate should be made broadcast before planting, preferably some weeks before. The nitrate is very soluble, and is easily leached from the soil; consequently, it is best applied in two or three applications, one at time of sowing seed, the next shortly after germination, and the last application when the growing crop is two or three inches high. This will supply the nitrogen all in the stage of early growth, when it can be utilized by the plant to the best advantage.

PREFERENCE SHOWN BY PLANTS FOR DIFFERENT FORMS OF FOOD.

It is a fact of great interest and importance that one form of fertilizing constituent is preferred by some plants to the same constituent in another form. This preference is indicated by greater yield, or by better quality, or by both; thus, wheat seems to give better results when nitrogen is applied in the form of nitrate of soda than in any other form. Spinach has been found to do better with sulphate of ammonia than with nitrate of soda, while the reverse is true of asparagus. The quality of tobacco is injured by potash in the form of muriate, and hence only sulphate should be used for fertilizing purposes. The quality of sugar beets and potatoes appear to be better when sulphate of potash is used. Hence, while the soil may contain certain quantities of fertilizer naturally, it would pay to give serious attention to the so-called chemical fertilizers, and to their nature and source.

USE OF FERTILIZERS.

There is no way to tell without experiment what food constituent a soil lacks. The crops themselves give valuable suggestions. As a rule, lack of nitrogen is indicated when plants are pale green in color, or when there is a small growth of leaf or stalk, other conditions being favorable. A bright deep green color with vigorous growth of leaf or stalk is in the case of most crops a sign that nitrogen is not lacking, but does not necessarily indicate that more nitrogen could not be used to advantage. An excessive growth of leaf or stalk accompanied by imperfect flower and fruit development indicates too much nitrogen for the potash and phosphoric acid present.

When such crops as corn, cabbage, potatoes and so forth, have a luxuriant, healthful growth, an abundance of potash in the soil is indicated, also when fleshy fruits of fine texture and flavor can be grown. On the contrary, when these plants fail of luxuriant growth, or are very low grade in quality, it is a certain indication that potash is lacking. When a soil produces good, early maturing crops of grain, with plump and heavy kernels, phosphoric acid will not generally be found deficient in the soil.

In order, therefore, to ascertain with greater certainty what food constituents are lacking in any particular soil, the surest, in fact the only way, is for each farmer to conduct experiments on his own soil and crops. Apply fertilizers as indicated in the preceding tables. The results can then be studied and the yield of crop. In carrying on such experiments, several difficulties may be met. The season may frequently be such as to interfere seriously with the favorable action of the fertilizers applied. Thus, severe drought may counteract all other conditions and prevent a satisfactory yield. The difference in the mechanical condition of the soil of the same farm, or even the same field, may prevent a fair comparison of the action of the different kinds of fertilizing materials. A late, wet spring may also interfere. But notwithstanding these difficulties, valuable suggestions will be obtained from an experimental study of one soil through the behavior of the crop.

SUGGESTIONS REGARDING THE PURCHASE OF FERTILIZERS.

It will generally be found more economical to purchase separate fertilizing ingredients, rather than mixtures. In applying fertilizers, bulk is often desirable, but in purchasing commercial fertilizers the object should be to secure as much nitrogen, potash and phosphoric acid in available forms as possible for one dollar, instead of as many pounds as possible of fertilizer regardless of the amount of plant-food contained in it. This is particularly applicable to mixed fertilizers. Since there is smaller bulk to handle in mixing, a smaller number of packages for holding, and, consequently, less weight and freight, as before stated, it is, as a rule, more economical to purchase fertilizers in their more concentrated forms. For example, it is more economical to purchase one ton of a high-grade fertilizer than three tons of a low-grade fertilizer, one ton of the former containing the same amount of plant-food contained in the three tons of the latter; because, in making the latter, three times as many packages are required and three times as much freight must be paid for the same amount of plant food.

Fertilizers cannot, as a rule, be too finely ground, nor can they be too dry. With many materials, bone for example, the availability as plant-food is directly dependent upon the fineness of division. Excessive moisture in fertilizer is undesirable for several reasons. First, the larger the amount of moisture, the smaller will be the amount of plant-food; second, excess of moisture causes the particles to stick together, and is likely to result in caking; third, an excess of moisture favors the decomposition and loss of nitrogen in many forms of organic matter.

FERTILIZERS FOR DIFFERENT TYPES OF SOILS.

As our knowledge of the fertilizer requirements of different types of soils found in Ontario is incomplete, we cannot always give definite information as to which fertilizer or fertilizers will give the best results in every case. The following general suggestions with regard to this question are in accord with our present knowledge of the principles involved.

Soils which have been largely depleted of their plant-food through continuous cropping and which respond readily to applications of barnyard manure, should receive a general fertilizer containing all three constituents of plant-food—nitrogen, phosphoric acid and potash.

Sandy and light soils are especially benefited by applications of potash, and will not, as a rule, be benefited by phosphates—basic superphosphate excepted. The clay, clay loam, and loam soils, on the contrary, do not often need potash, but are frequently improved by applications of phosphates. As stated in a recent bulletin,* acid soils (indicated by litmus paper test) will respond to applications of lime and available phosphates.

Muck soils are rich in organic matter and usually in nitrogen, and, as a rule, require potash and phosphoric acid, and sometimes lime. In our experiments we have found that potash, or, still better, potash and phosphates, have greatly increased the yield of grain on swamp areas. In some cases we have found that these soils in our Province do not need lime, but in other cases we have found that lime, especially in the form of ground limestone, has given good results. Light sandy and clay soils are also benefited by dressing with lime.

It may be stated, as a general proposition, that soils of different types are likely to be especially benefited by the following system of fertilization: Sandy soils by nitrogen and organic matter; muck soils by potash and phosphates; clay soils by lime; and all acid soils by finely ground limestone.

AMOUNTS OF FERTILIZERS TO BE APPLIED.

No hard and fast rules can be given as to quantities of artificial fertilizers to be applied, as the amounts necessary to produce large crops will vary with the character and the state of fertility of the soil, the kind of crop to be grown, the time and manner of application, and other conditions. For ordinary farm crops from 500 to 700 pounds per acre may be considered a fairly heavy application; applications of from half a ton upwards will only give economical returns in cases of special crops grown under an intensive system of farming.

WATER FOR DOMESTIC PURPOSES.

There has been a growing demand in this Province on the part of farmers, as well as citizens in general, for an examination of waters with reference to their fitness for domestic purposes. During the past year this demand has increased and it is not easy to understand on what ground a matter of such vital importance to health can be ignored, even though there are other lines of investigation work of great importance to be conducted in Agriculture. The examination of doubtful water certainly meets an important public demand.

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* See Bulletin. Character and Treatment of Swamp Soils.

Pollution of Water.

In this section of the country, where so few deep wells exist and where we are almost entirely dependent on surface water for our supply, it is this class of water which most naturally interests us.

No surface water is free from animal and vegetable life. It is seldom, however, that any trouble arises from this cause when the water is taken directly from running streams, but the water in lakes and ponds and in storage reservoirs is very liable to be disagreeably affected by the growth and decay of animal, and, more especially, of vegetable organisms. The presence of fish in a source of water supply is rather an advantage than otherwise; however, cases arise in which for various causes a large number of fish die, consequently the source of supply must be watched and the dead fishes carefully removed. Other forms of animal life are abundant, but, fortunately, are easily removed by filtration.

One of the principal sources of vegetable contamination is fresh water *Algae,* which grow in nearly all water supplies. The disagreeable odor and taste of water, as "woody," "musty," and "fishy," can usually be traced to these plants. Their presence is not really a sign of pollution, but it is a fact that they thrive best in waters containing mud and vegetable extractive matters.

Sanitary chemists agree that the dangerous constituents of water are the products of organic decomposition, and the germs that feed upon them; hence, water that has been contaminated by sewage, by seepage from out-houses, etc., are uniformly condemned for potable use.

The question is frequently asked: "What is a pure water, suitable for drinking purposes?" or, "What are we to understand from the result of the analysis submitted?" The analytical chemist is not, however, especially concerned directly with the question as to the presence or absence of disease germs, and this phase of the question is left to the consideration of the bacteriologist. But the solids and organic matter are here more fully considered. The constituents to be examined for, in general, may be divided into two classes: organic and mineral matter.

A careful examination of the character of the organic matter frequently helps to throw light upon the likelihood of such water being contaminated, especially by sewage and other waste products which might make a possible source of typhoid fever infection.

The organic matter in water consists of what is known as albuminoid and free ammonia. Of these two, the albuminoid ammonia is by far the more important and is to be taken as an indication of pollution from either or both animal and vegetable sources.

Chlorine is the measure of the amount of chlorides in the water, and may come from chlorides naturally in the soil, or when in very marked quantities in inland waters is usually from sewer contamination.

Total solids is, as the name indicates, the amount of solid matter in water, whether in solution or mechanically mixed.

While no hard and fast standards can at present be laid down in judging of the fitness of water for domestic purposes, we are guided in general by the following rules, based on Wanklyn's Standards, which are more or less elastic, according to circumstances and environmental survey of the source of the water.

Unless water contains more than 40 grains per gallon of total solids, no exception need be taken to the solids as such.

Five or ten grains of chlorine per gallon are not an absolute bar to the use of the water, but only a reason for suspicion under certain circumstances.

If a water yields no albuminoid ammonia, it may be passed as organically pure, despite much free ammonia and chlorine. If, indeed, a water yield 0.02 or less than 0.05 per million, then the free ammonia becomes a factor in the calculation, and a water should be regarded with a great deal of suspicion when such is the case.

Free ammonia being absent or present in very small quantities, a water should not be condemned unless the albuminoid ammonia reaches something like 0.10 parts per million. Albuminoid ammonia above 0.10 parts per million is a very serious thing, and when it reaches 0.15 parts per million the water is regarded as being positively unfit for domestic use.

Taking into consideration the fact that water analysis is an exceedingly difficult part of chemical work, and from the fact that the interpretation of results may mean so much, or so little, and that the effects of contaminated water on the human system are, at the present time, such open questions, though the evidence seems convincing, it is manifest that the analyst must be very guarded and if he err at all it should be on the side of safety.

WATER SAMPLES.

CONTAINER. A bottle of not less than one quart capacity is to be used, preferably one with a glass stopper. If there is no glass stopper, the bottle must be fitted with a new cork.

SAMPLES OF WATER ANALYSED IN 1909.

Water.	Total Solids	Chlorine	Free Ammonia.	Albuminoid Ammonia.
	Grains per gallon.	Grains per gallon	Parts per million.	Parts per million.
1. Well water	65.5	9.2	.306	.246
2. River water	20.3	.6	.003	.021
3. Well water	60.3	.036	3.600	.210
4. Creek river	41.0	....	trace	.02
5. River water	44.0	12.600	.240	.227
6. River water below sewage plant.	38.0	5.400	.80	.493
7. Well water	25.0	7.380	.053	.036
8. River water	75.6	7.600	.146	.480
9. River water, at outlet of sewage system	40.0	6.500	.180	.760
10. River quarter mile down stream from sewage plant	18.66	1.100	.022	.080
11. Well water	24.82	5.000	.004	.003
12. Well water	15.99	3.000	.013	.003
13. Spring water	17.99	2.200	.030	074
14. Spring water	57.9	3.200	.046	.050
15. Well water	23.13	.040	.050	.030
16. Spring water	.....	325.5	29.320	.300
17. Well water	25.5	.5	traces	.0002
18. City water	19.57	.05	none	.03
19. Lake water	7.9	trace	.052	.02
20. Well near house	21.28	trace	.066	033
21. Well near barn	19.4	.4	.029	.001
22. Well near outhouses	87.2	4.2	.780	.378

PREPARATION. The bottle must be thoroughly cleaned, all foreign substances removed, and scalded out with boiling hot water and then allowed to drain until cool.

TAKING OF SAMPLE. If the sample is to be taken from a well, the water must be pumped out for about five minutes, or long enough to empty all pump connections before the sample is taken; if from a tap, the water must be allowed to run to waste for about ten minutes, or long enough to empty all local laterals, before sampling. Water standing in the pipes in a house is under very favorable conditions for the multiplication of bacteria. If, therefore, the precaution of running off the water be not taken, a very erroneous conclusion as to the number of bacteria present may be drawn. If the sample is to be taken from a lake or stream, it must be taken some distance from the shore, the sampling vessel being plunged a foot and a half below the surface, to avoid the surface scum. Samples are not to be taken immediately after a storm.

From wherever the sample is taken, the bottle must be rinsed out several times with the water to be analyzed. The bottle must not be filled quite full, a small space must be left for the expansion of the water. Cork, and tie a piece of cloth over the neck to keep the cork in place. Do not use sealing wax.

It is not necessary to comment on every analysis, for an examination of the table will pretty clearly indicate the quality of the sample. There are a few samples, however, to which attention may be specially directed.

Sample No. 8 was taken from a river near sewage plant—water greatly contaminated.

Sample No. 1 was taken from a new well, yet the water is very bad.

Sample No. 16 was taken from a spring. The water is badly contaminated.

Sample No. 22 was taken from a well near outhouses. The water is bad, and the well has since been filled in.

Samples Nos. 17, 18 and 19 are excellent in every respect.

It may be here stated that clear, cold water, is not necessarily pure. Great care should, therefore, be taken to keep the wells, springs, and other sources of supply clean, paying particular attention to both animal and vegetable contamination.

Do not invite pollution by locating a well near a cesspool or barnyard.

Undoubtedly the best water for drinking is a moderately soft spring water, in which the possibility of pollution is out of the question. Unfortunately, however, it is very seldom that such water is available in sufficient quantities to supply large towns. Many spring waters are so hard that, while suitable for drinking, they are totally unfit for many manufacturing processes, for steam boilers, and for washing and culinary purposes.

The question has often been asked why a sample of water taken from one point in a city service is more contaminated than from another, both coming from the same source. This question is answered in the main by the fact that in most city systems there are so-called "blind ends" to the mains and which are very seldom flushed; consequently, there collects at points large amounts of sediment, organic and otherwise, which is churned up there, and a sample taken from near this end through a service pipe will necessarily be more contaminated than one taken farther away.

SAMPLES OF MISCELLANEOUS MATERIALS ANALYSED DURING THE YEAR.

Sample.	Moisture.	Nitrogen.	Insoluble residue.	Oxides of iron and aluminum.	Lime (CaO).	Potash (K_2O).	Phosphoric acid (P_2O_5).
No. 1. Ashes, Simcoe, Ont.	.57		41.14	14.10	25.35	3.93	1.89
No. 2. Ashes, Lindsay, Ont.					38.44	2.22	1.12
No. 3. Ashes					27.12	1.29	1.52
No. 4. Garbage ash, Port Dalhousie		.24				1.31	1.66
No. 5. Ashes, Stamford	27.37		25.98		24.09	1.86	1.78
No. 6. Ashes, Stamford					38.00	1.33	1.17
No. 7. Garbage ash, Toronto					8.57	2.57	3.57
No. 8. Ashes, Jordan Harbor	3.52				32.28	4.55	2.57
No. 9. Garbage ash, Toronto				5.31	8.12	1.27	1.65
No. 10. Wood ashes	5.26				36.45	5.14	1.32
No. 11. Hard coal ashes				3.68	12.48	trace	1.10
No. 1. Fertilizer, Winona		3.18				3.62	12.60
No. 2. Bone Phosphate, Grimsby							22.58
No. 3. Fertilizer, Wallaceburg	20.25	1.06				2.27	.05
No. 4. Bone Phosphate, Niagara District							25.15
No. 5. Bone Meal, Guelph							31.56
No. 6. Potassium Sulphate, Toronto						45.15	
No. 7. Ground Caplin, Newfoundland		6.66					
No. 8. Ground Kelp, Newfoundland		1.58					

WOOD ASHES.

From the above figures it will be seen that wood ashes are an important fertilizer, and particularly so as a supplier of potash, which exists in a soluble form and is, therefore, readily available to plants. The amount of potash varies, it will be seen, from about 1.29 to as high as 5.14 per cent. They also contain a fair amount of phosphoric acid, and are, of course, very rich in lime, and therefore make a good fertilizer to apply to acid soils. Farmers would do well to apply their wood ashes to their own land rather than selling them to buyers from the United States, as is being largely done at present.

A number of samples of garbage ash have also been examined. In addition to supplying potash and phosphoric acid, they also contain some nitrogen.

ROAD MATERIALS.

A number of samples of limestone rock and sand have been examined to determine their suitability for road construction. A material for road construction should not contain a large amount of clay, as it is then apt to disintegrate and break up more rapidly. The amount of phosphoric acid (P_2O_5) should not much exceed 1 per cent., and it should not consume more oxygen than 0.3 per cent., that is to say, oxidizable matter should not be present in large amount.

Of the samples analysed, No. 2 would appear to be the best material for road construction.

ANALYSIS OF ROAD MATERIALS.

Sample.	Insol. matter.	Iron and aluminum oxides.	Lime (CaO).	Magnesia (MgO).	Organic matter.	Phosphoric acid (P_2O_5).
No. 1. Limestone	5.49	2.29	31.31	15.17	....	....
No. 2. "	.03	1.11	34.40	20.30	....	....
No. 3. "	3.19	3.05	39.95	18.94	....	....
No. 4. "	4.70	3.50	....	....	....	....
No. 5. "	2.05	5.50	....	....	....	....
No. 6. "	3.22	....	....	....	....	....
	Clay.		Sand (S_1O_2).			
No. 7. Sand	2.25	4.14	50.50	....	1.24	....
No. 8. "	13.56	6.38	56.92	....	2.17	....
No. 9. "	3.03	2.61	84.32	....	1.15	....

THE RELATION OF GEOLOGY TO AGRICULTURE.

A scientific study of soils, a study of their productive capacity, and of their requirements, cannot be carried on satisfactorily without a practical working knowledge of geology, that is, a knowledge of the composition and richness of the rock strata that lies beneath the soil and a classification of rocks into natural orders, or deposits. All Experiment Stations are now agreed that the question of soil investigations must be carried on from four standpoints, chemical, physical, geological, and botanical.

The cause of the diversity of soils is due to the difference in the underlying rock. If the rocks in two districts differ, the soils of the same are likely to differ also, and in a like degree. All soils, however, do not partake of the nature of the rock beneath them. In Ontario, for instance, the great variations have resulted from the work of glaciers, during the Great Ice Age.

The changes in agricultural character, however, and the capabilities of a soil are very closely related to the changes in the geological strata which form its surface. Though here and there there are natural soils that are buried by transported materials, yet the political economist may, nevertheless, safely estimate the general agricultural capabilities of the resources of a country by a study of its geological structure, the capitalist judge in what part he is likely to meet with a profitable investment, and of more importance to us, the practical farmer in what locality he may expect to find land that will best reward his labors, that will admit of the kind of culture to which he is most accustomed, or by the application of better methods will manifest the greater agricultural improvement.

In conclusion, let me thank you for having secured the appointment of Mr. A. E. Slater to this department, and to express my appreciation of the valuable service he has rendered.

Respectfully submitted,

W. P. GAMBLE.

PART VIII.

THE PROFESSOR OF VETERINARY SCIENCE.

To the President of the Ontario Agricultural College.

Sir,—I have the honour to submit my report for the year 1908-1909.

Class Room.

First Year. To this year I gave a course of lectures on Veterinary Anatomy, briefly, but somewhat comprehensively, considering the skeleton, ligaments, muscles, tendons and joints; the digestive, respiratory, urinary and generative systems; the circulatory and absorbent systems; the nervous systems; the skin, eye, ear, and foot.

I also gave a course of lectures on Veterinary Materia Medica, considering the source, properties, actions, uses and doses of the various drugs and remedies that are used for the prevention and cure of the ordinary diseases to which farm stock is subject.

In addition to the above I gave a series of lectures on the construction of horse stables, as regards site, material, drainage and ventilation; the kinds, size and arrangements of stalls; the general care of horses as regards feeding, watering, grooming, etc.; the care of harness and rigs, etc. I also gave a course of lectures and demonstrations on the characteristics of the different breeds and classes of horses, using for such purposes the horses of the institution, my own horses, and some that I borrowed.

Second Year. To this class I gave a course of lectures on Veterinary Medicine and Surgery, speaking of and illustrating, when possible, the causes, symptoms and treatment, both preventive and curative, of the ordinary diseases of farm stock.

I also gave a course of lectures on Veterinary Obstetrics, treating of the phenomena of conception, gestation and parturition. We considered the diseases of both dam and offspring incident to, and dependent upon, the parturient state and of such diseases as are liable to occur to either until the offspring has reached the age at which it can live without the aid of the dam. In addition I gave a course of lectures on judging horses, and a series of practical demonstrations on educating colts, handling horses, securing horses for the performance of minor operations which the average stock-owner should be able to perform; the different methods of administering medicines, etc., etc.

Third and Fourth Years. To these classes I gave some further instructions in judging horses, using the animals at our command, and visiting some breeders' and importers' studs.

Special Dairy Class. To this class I gave a short course of lectures on the causes, symptoms and treatment, both preventive and curative, of the ordinary diseases of dairy cattle.

Short Course in Stock Judging. This course was well attended and apparently highly appreciated by the class. As usual, a very large percentage of the horses used was supplied by the neighboring breeders, importers and dealers, and I take this opportunity of publicly thanking Messrs. Sorby, A. McCannell, W. McCannell, Baker Bros., Palmer Bros., Tovell, Dr. Short, and others, for their kindness in not only allowing us the use of their horses, but either coming with them or sending grooms.

DISEASES IN STOCK.

Horses. We had several cases of the ordinary diseases in horses, as colic, scratches, lymphangitis, lameness from different causes, constipation, influenza, strangles, etc., and all of which yielded to treatment. We had two fatal cases of acute indigestion, and also lost a colt from irregular strangles.

Cattle. We had several cases of the common diseases, as impaction of the rumen, fardel bound, mammitis, parturient apoplexy, difficult parturition, retention of the placenta, etc., all of which recovered. We had a fatal case of metritis, and one of fardel bound, and also lost a heifer during parturition.

Sheep. We lost one ewe from disease of the liver and one from rupture of the womb, and one from septic metritis.

Swine. We had little trouble with the swine, other than with new-born animals.

Respectfully submitted,

J. H. REED

PART IX.

THE PROFESSOR OF DAIRY HUSBANDRY.

To the President of the Ontario Agricultural College:

Sir,—I beg leave to submit my nineteenth annual report of the Dairy department of the College.

The work of the department may be conveniently grouped under three divisions: Teaching, Commercial Creamery, and Experimental.

Teaching.

The Teaching branch consists of two lines of work, viz., that given to the regular College students and that for special courses in dairying.

To the first year is given a course of lectures and practical work relating to the Farm Dairy. In the second year the lectures and practical work relate to co-operative dairying. The students who specialize in dairying during their final year are given advanced lecture work and a laboratory course of experiments relating to cheesemaking, separators, buttermaking and milk-testing.

There are three short courses given in dairying each year, chief of which is one of three months to factory cheese and buttermakers and to farmers' sons and daughters. There are usually about twenty-five students from the Macdonald Institute who take the farm dairy work in this course in addition to the regular short course students. At the close of the three months' course, one-week courses are given for Dairy Instructors and for those desiring special help in milk and cream testing. The attendance at the short course in dairying was seventy-one.

A course of lectures was also given to the two Teachers' Training Classes this year.

O. A. C. Creamery.

In order to insure a regular and sufficient supply of milk and cream for practical training of dairy students and for experimental purposes we established last year a commercial creamery in the Dairy Department. One of my assistants, Mr. Stratton, has been given full charge of this part of the work. His report for the year is included. We now have a sufficient and fairly uniform supply of raw material. This has been of material help to us in both our teaching and experimental branches. Formerly, we have had a great deal of trouble in securing milk and cream as the College is not located in a dairying, but in a beef-raising section. However, we are glad to report that we have been able to demonstrate to the farmers about Guelph that *dairying pays*. You will see from Mr. Stratton's report, that the sum received for manufacturing butter aids considerably in meeting the expenses of the department. Milk used for cheesemaking and for the purpose of furnishing cream to the College and Macdonald Hall is purchased outright from the farmers at the average price per pound of fat paid each month to creamery patrons, plus twenty cents per 100 lbs. milk in lieu of the skim-milk. This arrangement appears to be a satisfactory one. After the cheese are required no longer for educational or experimental purposes they are sold, usually at regular market prices.

The cream is sold at 20 cents per quart for 22 per cent. cream, and the skim-milk is sold to the Farm at 20 cents per 100 lbs. Following is Mr. Stratton's report:

Prof. DEAN,—I beg leave to submit the following summary of the business done by the Ontario Agricultural College Creamery for the year ending November 30th, 1909:

Month.	Lbs. Fat Received	Lbs. Fat used in Butter-making	Lbs. Fat sold in Cream	Lbs. Butter made.	Total Sales of Butter and Cream	Per cent. Overrun	Average Selling Price per lb. Butter	Net Price per lb. Fat paid to Patrons
					$ c.		c.	c.
December, 1908	5,997.54	5,891.67	105.87	7,110	2,239.10	20.6	31	33
January, 1909..	5,025.58	4,875.99	149.59	5,736	1,819.13	17.6	30.76	32
February......	5,243.32	5,058.67	184.65	5,846	1,738.67	15,5	28.64	29.3
March.........	6,929.70	6,713.18	216.52	8,204	2,300.07	22.0	27.11	29.2
April..........	7,660.66	7,434.54	226.12	8,865	2,400.43	19.2	26.82	27.3
May......... ..	10,344.67	10.085.57	259.10	11,942	3,054.58	18.4	24.87	25.5
June	14,465.48	14,220.39	245.09	16,891	3,930.48	18.7	22.76	23
July.	12,741.91	12,741.91	....	15,134	3,632.57	18.7	24.00	24.5
August	12,019.31	12,019.31	....	14,458	3,520.41	20.2	24.35	25.3
September	9,882.03	9,882.03	....	11,768	2,958.23	19	25.13	26
October	7,883.16	7,883.16	....	9,175	2,523.06	16.5	27.5	28
November .	7,551.61	7,551.61	....	8,905	2,583.97	17.9	29	30.2
Totals and Averages.	105,744.97	104,358.03	1,386.94	124,034	32,700.70	18.8	26	27

Respectfully submitted,

R. W. STRATTON.

EXPERIMENTAL WORK.

During that part of the year (May to September) when we have no students the men and equipment are engaged in experimental work, details of which are submitted.

Two quite important lines of investigation are not reported on, to which a reference will be in order. For two years Mr. Taylor, our Instructor in Milk-testing, has been conducting a series of investigations comparing the testing of patrons' cream at each delivery with composite sampling. The results have been somewhat conflicting and we have thought it advisable to withhold the results until we have more data. Many creamery experts are advising the testing of cream at each delivery, and discarding the use of the composite method of cream sampling. In our own creamery we follow the plan of testing composite samples monthly. Whether or not this is best we are not prepared to say at present. If it were not for the extra labor involved in daily or individual delivery testing, we should certainly advise this method. Aliquot or proportionate sampling compared with the ounce dipper plan was tested, together with various preservatives, and weighing 18 grams of cream into the Babcock test bottle instead of measuring 18 c.c. There did not appear to be any advantage in aliquot sampling as compared with taking a uniform quantity for composite samples of cream. With the cream scales as ordinarily found in creameries it is a question whether the average man will obtain any more accurate results by weighing than he will by measuring.

The other line of dairy work, which is practically new in Ontario, is the making of "soft" and fancy cheese.

During the month of February we engaged Mr. F. G. Rice, a graduate of the Midland Dairy School, England, to give instruction to the dairy classes on this phase of dairying. After the School term was over we entered into an arrangement with him to continue the work on a commercial scale in order to test the Canadian market for these cheese.

We agreed to furnish Mr. Rice with a room and most of the utensils required. He bought the raw material and did the work, reaping whatever profit there might be in the business. In this way we ran practically no risk, and it gave us an opportunity to test the advisability of going into this branch of dairying. The results have been fairly satisfactory with "Stilton," "Camembert," and "Double Cream" cheese. The "Gervais" do not seem to be quite so popular. The chief trouble is in preventing the soft cheese spoiling during hot weather. Owing to the large amount of moisture which these cheese contain they tend to spoil very quickly in summer. Where a steady market can be obtained the profits are more than double what could be made in the usual way from hard cheese.

I am indebted to my assistants, Messrs. Stratton, Ralph, Taylor, and Wood, to Miss Sparrow, Stenographer, to the Instructors of the Dairy School, to the Western Ontario Cheese Instructors, and to the heads of several departments of the College and their assistants for help and co-operation during the year. The Chemical, Bacteriological and Animal Husbandry Departments have co-operated with us in the various lines of work. We desire to express our appreciation of the courtesies extended.

SUMMARY OF MANUFACTURING ACCOUNT, DECEMBER 1, 1908, TO NOVEMBER 30, 1909.

Amount of milk received for making cheese	291,494	lbs
Milk received to be made into butter or sold as cream or skim milk	167,274	"
Amount of cream received	354.337	"
Cheese manufactured	26,572	"
Butter manufactured	124,034	"

Receipts.	$	c.	Payments.	$	c.
Milk and cream	977	16	Hauling	2,330	21
Cheese and butter	35,208	38	Milk	4,400	47
Manufacturing butter	4,023	35	Patrons	33,005	06

In February and March 2,495 lbs. cheese-room milk was used for making soft cheese.

CHEESE AND BUTTER DIPLOMAS.

More interest than usual has been manifested during the past season regarding Diplomas for Cheese and Butter making. This is doubtless due, in part at least, to the recent legislation which requires that all head cheese and butter makers in the Province must have a diploma from a Dairy School or possess a permit from the Minister of Agriculture before they will be allowed to have charge of a factory after January 1st, 1911.

The following have made application for diplomas in 1909. Their names will come before the Dairy School Staff in 1910, when, if reports are favorable, diplomas will be granted:

Name.	Address.	Diplomas.
Andress, A. L.	Indian River, Ont.	Cheese.
Barber, A. E.	Cumberland, Ont.	"
Brown, J. L.	Ingersoll, Ont.	"
Brown, Wm.	Ridgetown, Ont.	Butter.
Clark, W. J.	Bieber, Cal., U.S.A.	Cheese.
Clubb, John R.	Brigden, Ont.	Butter.
Easton, J. L.	Dresden, Ont.	"
Goodhand, I. C.	Corbett, Ont.	"
Herries, G.	Lakeview, Ont.	Cheese.
Neilsen, Geo.	Qu'Appelle, Sask.	Butter.
Pressey, R. A.	Kerwood, Ont.	Cheese.
Waddell, J A.	Kerwood, Ont.	Butter.
Wilson, J. E.	Keyser, Ont.	Cheese and butter.

OFFICIAL COW-TESTING.

There has been considerable activity manifested among breeders of dairy cattle in the way of Official Testing during the year. During December 1st, 1907, to December 1st, 1908, there were supervised by us 85 seven-day, and 5 thirty-day tests, a total of 90. From December 1st, 1908, to December 1st, 1909, we have supervised 134 seven-day tests, and nine thirty-day tests, making a total of 143 for the year. All of the cows tested were Holsteins, and all in the Province of Ontario, except one in Quebec. The Superintendent of the Dairy School at Kingston took direct charge of the tests for us in Eastern Ontario.

Mr. Wood, of the Dairy staff, had direct supervision of as many tests as possible during the year, but we employed a number of others in addition. All expenses, save postage and clerical work, is borne by the owners of the cows tested. We certify to the results and forward them to the Secretary of the Holstein Association at St. George, Ont., or to the Superintendent of the American Association for the American Herd Book.

The following is the list of breeders for whom tests were conducted in 1909:

Name and Address.	No. of cows.
Seven day tests.	
Brown, W. W., Lyn.	4
Caughell, David, Yarmouth Centre.	6
Dent, T. H., Woodstock	1
Dunkin, T. L., Norwich	3
Dunn, Andrew, Ingersoll	12
Ede, P. D., Oxford Centre	3
Flatt, D. C. & Son, Millgrove	5
Foster, A. D., Bloomfield	4
Gilroy, G. A., Glen Buell	3
Goodison, Thos., Manhard	1
Griffin, F. G., Burgessville	3
Haley, M. L., Springford	14
Hallman, A. C., Breslau	1
Hamly, W. E., Rockford	3
Hartley, Thos., Downsview	4
Laidlaw, E. & Sons, Aylmer	4
McDonald, H., Bloomfield	1
McQueen, T. W., Tillsonburg	2
Mallory, B., Frankford	2
Manhard, G. H., Manhard	7
Pallett, Geo. W., Summerville	5
Pearce, C. J., Ostrander	1
Seven day tests.—Cont'd.	
Pettit, F. E., Burgessville	1
Purtel, E. B., Bloomfield	1
Rice, Geo., Tillsonburg	9
Richardson, J. W., Caledonia	7
Rivers, Walburn, Foldens	4
Schell, W. S., Woodstock	9
Simmons, W. H., New Durham	3
Smith, E. A. & Son, Millgrove	2
Smith & Dyment, Dundas	1
Salley, P. J., Lachine Rapids, Que.	1
Stewart, J. W., Lyn	3
Teeple, A. H., Curries	2
Thompson, W. E., Woodstock	2
Total, seven day tests	134
Thirty day tests.	
Brown, W. W., Lyn	4
Richardson, J. W., Caledonia	4
Stewart, J. W., Lyn	1
Total, thirty day tests	9

MILK AND CREAM SAMPLES TESTED.

As usual, we have tested a large number of samples of milk, skim-milk and cream during the year, the total being 264.

One special case is worth mentioning. A farmer sent a sample of cream and skim-milk from his cream separator, to be tested, saying that he had suspected for some time the machine was not working well. The cream tested 19 per cent. fat and the skim-milk two per cent. We wrote advising not to use the separator until it was put in order as it was simply wasting milk-fat and that much better results in creaming could be obtained by setting the milk in pans or deep cans set in cold water.

About a month later this man sent us two samples of skim-milk and one of cream from the same machine, which had now been put in good repair. The results were .04 and .08 per cent. fat in the skim-milk samples and 35 per cent. fat in the cream. This was quite satisfactory, but in the meantime he had no doubt lost a good many pounds of milk fat and butter.

CREAM PRESERVATIVES; TEMPERATURE FOR HOLDING COMPOSITE SAMPLES; TESTING ONCE VS. TWICE PER MONTH.

Kind of Preservative.	Method of sampling.	Temperature.	Percentage of fat in sample.		Remarks on samples.
			18 grams in B. bottle.	18 c.c. in B. bottle.	
Corrosive sublimate (1 part) Bi-chromate potash (3 parts)	Uniform quantity with ounce dipper.	60° to 70° F.	24	23.5	Sample in good condition.
Corrosive sublimate (1 part) Bi-chromate potash (3 parts) Tested twice in month	Uniform quantity with ounce dipper.	about 40° F.	23 5	24.	" "
		80° F. to 85° F.	22.5	23.	Some mould.
		60° F. to 70° F.	23.8 av. of two tests.	23.7 av. of two tests.	Good condition.
Corrosive sublimate (1 part) Bi-chromate potash (3 parts)	aliquot sampling. ½ c.c. per lb. cream.	60° to 70° F.	23.5	24.	" "
Corrosive sublimate (1 part) Bi-chromate potash (3 parts) Tested twice in month	" "	40° F.	24	23.5	" "
	" "	60° to 70° F.	23.7 av. of two tests.	23.7 av. of two tests.	" "
	" "	80° to 85° F.	22.	22.5	" "
Corrosive sublimate (1 part) Bi-chromate potash (7 parts)	" "	60° to 70° F.	23.5	23.5	" "
	" "	40° F.	23.5	23.5	Composite sample good.
Formalin, 1 c.c. per pint sample	" "	60° to 70° F.	29.5	26.5	Fat in Babcock bottle burned.
Formalin	" "	40° F.	24.5	23.5	Readings not satisfactory.
Gillett's Lye	" "	60° to 70° F.	23.5	23.	Lumps of curd in sample.
Gillett's Lye	" "	40° F.	23.5	23.	Readings very clear, best of any.

During the month of May four different kinds of preservatives for composite cream sampling were tested, viz., bichloride of mercury (corrosive sublimate) one part, and bi-chromate of potash three parts; same, mixed one part of corrosive sublimate and seven parts bi-chromate of potash; formalin and Gillett's Lye. All four of these were compared in samples kept at ordinary room temperature, and in similar samples kept in cold-storage at a temperature of about 40° F. The first one was also tested in composite samples kept moderately warm near a steam pipe. Comparisons were made by testing composite samples every two weeks with similar samples tested at the end of one month.

There was used of the sublimate-chromate preservative about what would lie on a five cent piece for each sample where the 1 to 7 mixture was used, and a little less of the 1 to 3 mixture. One c.c. of formalin, or about twenty-one drops, were placed in the composite bottle for a preservative, while of the Gillett's Lye, a piece about the size of a grain of corn was added to each sample at the beginning of the test.

Conclusions.

1. Of the various preservatives tested for composite cream samples, a mixture of one part bi-chloride of mercury (corrosive sublimate) and three parts of potassium bi-chromate (bi-chromate of potash) used in the proportion of a little less than what will lie on a five cent piece for preserving a pint cream sample for one month, has given the best all-round results.

The formalin preserves the samples in good condition but there are difficulties in the testing of samples where this is used. There appears to be a precipitate of curdy matter which if read as fat make the readings altogether too high—in these tests about five per cent. too great.

2. Composite cream samples kept in cold storage at a temperature of about 40 degrees F., were in the best condition and point to the fact that creamerymen might utilize their refrigerators as a place for keeping composite samples, with profit. Samples kept in a warm place are inclined to mould and to give results too low. Why the tests should be lower from composite samples kept in a warm place is not easily explained, unless it is due to the absorption of moisture, although the bottles were kept tightly corked, except when samples were being taken and at the time of testing for fat.

3. There did not appear to be any advantage in testing twice a month, as compared with testing once a month as indicated by these experiments.

4. Aliquot, or proportionate cream sampling, gave results similar to those obtained by taking uniform quantity (about one fluid ounce) from each delivery, although there was considerable variation in both weight of cream and percentage of fat in the deliveries—35 to 68½ lbs., cream testing from 18.5 to 29 per cent. fat.

EFFECT OF CULTURE (STARTER) AND PASTEURIZATION IN BUTTERMAKING.

Kind of cream.	% acid in cream.		Temp. of cream.		% fat in butter-milk.	Average flavor.		Average total.	
	Raw.	Ripe.	Delivered.	Churned.		1st score (50).	2nd score (50).	1st (100).	2nd (100).
Raw	.512	.575	68°F.	51°F.	.155	42	37.25	91.75	87.25
Raw +10% culture	.516	.606	68°F.	52°F.	.150	43	39.33	92.30	89.30
Pasteurized	.515	.487	68°F.	51°F.	.395	43	39.5	93.	89.5
Pasteurized +10% culture	.515	.555	68°F.	51.5°F	.357	42.5	39.5	92.	89.5

Four tests were made on August 13, 14, 18 and 19 on the effects of adding ten per cent. culture to raw and pasteurized cream. The cream as delivered to our creamery was divided into four lots: One was churned raw; one lot of raw cream had ten per cent. culture added; another lot of similar cream was pasteurized and churned without culture and the fourth lot was pasteurized, having ten per cent. of culture added. In all four cases the cream was held overnight in the vat and churned the following morning after delivery.

Conclusions.

1. The buttermilk from the pasteurized lots contained a higher percentage of fat than did the raw cream lots. These results agree with those obtained in other experiments, indicating a much greater loss of fat in the buttermilk where sour cream is pasteurized.

2. There was not so much difference in the quality of the butter when fresh, but the raw cream having ten per cent. culture, and the pasteurized lots, held their flavor better when scored at the end of two or three months. The addition of a pure culture (starter) to raw cream as ordinarily delivered to creameries will no doubt improve the flavor of the butter, and in these experiments the results were practically the same as from pasteurization, with the advantage of less fat lost in the buttermilk. However, we do not think that the use of a culture, or "starter," in cream will altogether take the place of pasteurization, but may be recommended where pasteurization is not practicable.

EFFECT OF CREAM ACIDITY ON LOSS OF FAT IN BUTTERMAKING WHEN PASTEURIZING.

In order to study the effect of acidity in cream on the loss of fat sustained in the buttermilk through pasteurization, the records from fifty-six churnings during the months from April to August are summarized according to the percentage of acid contained in the cream at the time of delivery and pasteurization.

The main points are indicated in the following table:

1. Lots of cream containing less than .35% acid— 9 experiments.
2. " " .35% to .4% acid—7 experiments.
3. " " .4 to .45% " — 7 "
4. " " .45 to .5% " —11 "
5. " " .5% acid or over —22 "

The main points are indicated in the following table.

Per cent. acid in cream.				Per cent. fat in			
When pasteurized.		When churned.		Cream.		Buttermilk.	
Range.	Average.	Range.	Average.	Range.	Average.	Range.	Average.
.22 to .34	.304	.45 to .52	.477	26.5 to 30	27.6	.08 to .27	.133
.37 to .4	.387	.44 to .62	.495	25.5 to 28	26.6	.08 to .6	.20
.42 to .45	.430	.43 to .53	.470	27. to 28.5	27.5	.13 to .41	.232
.46 to .5	.473	47 to .59	.515	26. to 29.5	27.2	.08 to .8	.335
.51 to .57	.535	.47 to .6	.545	25. to 29.	26.7	.13 to 1.0	.522

The striking point about the foregoing table is the increased loss of fat in the buttermilk, as the percentage of acid in the cream at the time of pasteurization increased.

When the cream averaged from .3 to slightly less than .4 per cent. of acid, at the time of pasteurization the buttermilk did not test over .2 per cent. fat, which is usually regarded as "fairly exhaustive." As the acid in the cream increased above .4 there was an increase in the percentage of fat in the buttermilk, until when the cream at pasteurization had slightly over one-half of one per cent. acid, the percentage of fat in the buttermilk in individual churnings was from .8 to as high as one per cent., averaging over one-half of one per cent. from the twenty-two churnings recorded.

The practical lesson to be learned, is the importance of having cream as sweet as possible at the time of pasteurization, and that cream heated to 180 to 185 degrees when sour (containing .5 per cent. acid or more) means an extra loss of about one-half pound of butter per 100 lbs. buttermilk.

Cream can be delivered to our creameries practically sweet, if it be cooled and kept cold by the patrons immediately after separating and all the time until it reaches the creamery; and if delivery be often enough, say at least three times a week, to insure the cream not being too old or kept on the farm for too long a time.

(Whether or not it will *pay* to pasteurize sour cream we have discussed elsewhere.)

PASTEURIZATION OF SOUR CREAM AT 120, 140, 160 AND 180 DEGREES VS. RAW CREAM FOR BUTTERMAKING.

During the months of June, July and August, four lots of sour cream were pasteurized at 120 degrees F., eight lots at 140 degrees F., eight lots at 160 degrees F., eight lots at 180 degrees F., and four lots were churned raw. The cream was that delivered in the usual way to our creamery, ranging in acidity from .42 to .57 per cent. when delivered to us. The temperature of this cream ranged from 65 to 76 degrees F., when unloaded from the drivers' cans. After thorough mixing in a large vat the cream was divided into four lots, one of which was either churned raw or heated to 120 degrees, while the other three lots were heated to 140 degrees, 160 degrees and 180 degrees respectively. From three to seven per cent. culture (starter) was added to each lot, except in one churning of raw cream where no culture was added, and the cream allowed to remain in the vat overnight. It was churned the following day. The percentage of fat in the cream ranged from 24 to 29.5, and averaged about 27 per cent. at the time of churning. The acidity at the time of churning varied from .49 to .65, averaging about .5 per cent. for the pasteurized lots and .6 for those churned raw. The time required for churning each lot varied from 16 to 64 minutes, averaging 27.5 minutes for the lots pasteurized at 120 degrees; 24.1 minutes for the 140 degrees; 23.7 minutes for the 160 degrees; 22.6 for those pasteurized at 180 degrees, and forty minutes for the raw cream lots. The temperature of the buttermilk when churning was completed, varied from 54 degrees to 60 degrees, averaging 58.75 degrees for the lots heated to 120 degrees; 57.3 degrees for the 140 degree lots; 57.2 degrees for the 160 and 180 degrees lots, and 57.7 degrees for the lots churned raw.

The loss of fat in the buttermilk and scores of butter may be conveniently grouped in a table.

TABLE SHOWING LOSS OF FAT IN BUTTERMILK AND SCORES OF BUTTER FROM CHURNING CREAM PASTEURIZED AT DIFFERENT TEMPERATURES, AND RAW CREAM.

Kind of Cream.	Loss of fat in buttermilk.		Average of Scores.			
	Range %	Average %	Flavor.		Total.	
			1st. (50)	2nd. (100)	1st. (50)	2nd. (100)
Pasteurized at 120°F............	.27 to 0.9	.567	44.25	38.75	93.12	87.75
Pasteurized at 140°F.....	.16 to 1.2	.698	44.75	39.25	93.75	88.50
Pasteurized at 160°F............	.23 to 1.0	.695	44.70	39.12	93.37	88.10
Pasteurized at 180°F............	.22 to 0.8	.586	44.87	39.25	93.56	88.00
Raw cream	.16 to .29	.210	44.25	38.50	92.25	87.50

Two lots of the cream pasteurized at 180 degrees F., on June 30th and July 7th were divided, one part being kept in an ordinary cream vat over night and the other placed in cans, which were set in the cold storage over night. Both were churned at 48 degrees F. the following day. Both the lots set in cold storage had a low fat content in the buttermilk, viz., .25 and .17 per cent., averaging .21, or the same as the raw cream lots. It looked as if cooling were the remedy for the high loss of fat in the buttermilk from pasteurizing sour cream, but on August 20th, when a lot was cooled to a low temperature and churned at 50 degrees F., there was .8 per cent. fat in the buttermilk. On August 27th, churning at 51 degrees produced a buttermilk testing .8 per cent. fat, so that it would appear as if cooling to a low temperature is not a solution of the difficulty. Further study may throw some light on the question. It appears as if the heating of the sour cream coagulates the curd, which encloses the fat globules in such a way that they are not liberated by the process of churning.

Conclusions.

1. The pasteurization of sour cream caused an excessive loss of fat in the buttermilk as compared with the loss in churning similar lots of raw or unpasteurized cream. A range of temperature for pasteurizing from 120 to 180 degrees F. had about the same effect on fat lost in the buttermilk, the average loss at 120 degrees being about the same as at 180 degrees, while temperatures of 140 degrees and 160 degrees seemed to give slightly greater losses.

2. There was not much difference in the quality of the butter from the various lots when fresh, what difference there was being in favour of pasteurization at 180 degrees F. The keeping quality of the butter was improved by pasteurization of the cream at from 140 to 180 degrees F., there being very little improvement by heating the cream to 120 degrees F.

3. Where pasteurization is followed, we recommend having the cream as sweet as possible and adopting a temperature of 180 to 185 degrees F. The heating of sour cream to this temperature causes an extra loss of fat in the buttermilk, but this will, in all probability, be compensated for by an improved quality of butter—especially an improved keeping quality, which is of most importance in butter to be placed in cold storage for future use, or for shipment to distant markets.

DOES THE PASTEURIZATION OF SOUR CREAM PAY?

Since the year 1895 the Dairy department of the College has followed the plan of paseturizing either the whole milk before, or the cream after separating. We were led to adopt this plan after a careful study of Danish methods of butter-making in that year. Many Ontario creamery men have adopted the plan, then discarded it, or have followed it in but half-hearted manner. Most of these men have concluded that it does not pay. The extra cost of heating, cooling and labor, together with the heavy loss of fat in the buttermilk where sour cream is pasteurized, make it too expensive, so these men say. It is somewhat difficult to determine the extra cost of making butter by pasteurizing as compared with the ordinary methods, but it has been estimated at one-tenth of a cent per pound of butter.

In order to obtain some commercial data on the question of extra loss of fat in the buttermilk by pasteurizing, we kept exact records of 48 of our regular churnings where the cream was pasteurized during the seven months of April to October. During this time, thirteen churnings were recorded where the cream was not pasteurized. The cream in both cases was that delivered in the usual way by patrons living from one to ten miles from the College Creamery. Some cream is delivered by patrons direct to the creamery, but most of it is collected by drivers two or three times a week in the usual way of conducting a cream-gathering creamery. In our case the cream is collected in large cans.

The following table gives the chief data on this work:

——	Pasteurized Cream.	Raw Cream.
Number of experiments	48	13
Average per cent. acidity in raw Cream	.487	.485
Average per cent. acidity in ripe Cream	.525	.566
Per cent. fat in Cream	25.5 to 29.5	24 to 29
Average temperature for Churning	53.7°F.	52.4°F.
Average minutes for Churning	26.4	43.0
Average per cent. fat in Buttermilk	.477	.160
Average score in flavor:		
1st scores (50)	44.37	42.92
2nd scores (50)	39.10	37.76
Average total score:		
1st scores (100)	92.84	91.61
2nd scores (100)	88.08	87.15

The foregoing results indicate:

1. The pasteurized cream churned in less time than did the raw cream.

2. The loss of fat in the buttermilk was considerably greater by pasteurization as compared with churning raw cream, amounting in our creamery to about 330 lbs. fat during seven months, where the make was 88,233 lbs. butter. This extra loss of fat, at 25 cents per pound, and the extra expense for pasteurization would amount in round numbers to $150. The usual premium quoted by dealers for pasteurized butter is from one-half to one cent a pound. In our case, we receive, as a rule, about one cent a pound above average creamery prices. At one-half cent a pound the extra value of our butter during seven months was nearly $450. This leaves a clear profit over value of extra fat lost in the buttermilk and cost of pasteurizing of about $300. At a cent a pound premium the profit would be about $750.

3. The scores of the butter show an improved flavor and better general quality as a result of pasteurization.

In answer to the question, "Does pasteurization pay?" we may say, that in our case it does pay.

HAND PRINTING OF BUTTER VS. MACHINE PRINTING.

In recent years there has been a large growth in the pound print butter trade for local markets. Formerly, consumers were content to purchase butter packed in crocks or tubs and cut out in pieces as required, either by the shop-keeper or the housekeeper. Now, this is largely done away with and nearly all the best shops do a print butter trade almost exclusively. The pound package wrapped in parchment paper is so neat and convenient that nearly everyone prefers to purchase their butter in this form. In our own case, practically all our make is sold in the form of pound prints. A few years ago we packed a large share of our butter in boxes during the summer. A great many creameries do a "print trade" almost entirely. Quite a few dealers put in a supply of butter in boxes or tubs during June and July when butter is plentiful and lower in price, then print this during the winter when butter is scarce and dear. All this has led to the invention of machines for printing butter, in order to save labor of hand printing, more particularly where butter is printed from boxes that have been in cold storage and are more or less firm in body, making the butter difficult to print by means of a hand printer.

We have tried several of these machines with more or less satisfactory results. All are constructed on similar general principles, viz., the use of horizontal and vertical wires set in a frame to cut butter to the desired weight of one pound, and in the shape of an oblong or "brick" print.

The earlier machines were intended to print butter directly from the churn while in a more or less soft condition. Those we have tried were mostly failures.

In most of the latest machines the fresh butter is packed into cube-shaped boxes holding about ninety pounds. These boxes are then set in the cold-storage until the butter becomes firm, when it is cut into blocks or prints with wire attachments. This arrangement is quite satisfactory where the creameryman has a cold-storage convenient and more particularly when he is compelled to make several churnings in the same churn in one day, as many creamery buttermakers are compelled to do. The butter, providing there are a sufficient number of boxes on hand, can be quickly packed from the churn and set in a cool place until the rush of work is over for the day, or until the following morning. The butter is then brought out and quickly printed. For the best results, one man is needed to make the prints and two to wrap them in parchment paper.

As a result of some experiments conducted during the past season we arrived at the following conclusions:

1. The number of pound prints made from a churning were about the same whether printed by hand or machine, there being a slight difference in favor of the hand printing.

2. Owing to the fact that our cold storage is located about fifty yards from the creamery, the time required to take the butter to the storage, return it to the creamery, wash the boxes, etc., was greater than the saving of time in printing with the machine as compared with printing by hand, where two men did the work in both cases. Under our conditions there was no gain in time by using the machine, although the machine-made prints were more uniform and neater in appearance. It is altogether likely that creamery men, under average conditions would find the machine printer an advantage in their work, where a large print trade is carried on and where the cold-storage is located convenient to the churning-room.

CASEIN AND FAT IN THE MILK OF NINE COWS, BELONGING TO THREE DIFFERENT BREEDS, DURING ONE YEAR—NOV. 16, 1908, TO NOV. 15, 1909.

Last year we gave a preliminary report on the work done with reference to casein and fat in cows' milk during 199 days with each of three cows representing three breeds of dairy cattle. This work has been continued during the past year with the same nine cows as were used during the preliminary test. The nine cows selected were as nearly representative of their breeds as we could obtain from the herd. One Holstein (No. 76) and one Jersey (No. 131) did not drop a calf during the year, but we did not consider it advisable to substitute others in their places, as the object of the experiment is to study the casein and fat, more particularly the casein, in individual cow's milk for a series of years. The work is being continued with the same cows for another year.

The milk from each cow was weighed morning and evening once a week for this experiment and samples were taken for fat and casein determinations. The fat was determined by the Babcock and the casein by the Hart short methods.

The following tables give the records for each cow by months during the year, and a summary for each cow and for each breed, showing the number of days' milking, pounds of milk given, and also pounds and percentages of fat and casein in the milk.

	Days Milking.	Milk Lbs.	Fat Lbs.	Casein Lbs.
No. 76. HOLSTEIN, age 9, Freshened February 7th, 1908.				
November, 1908	15	540	19.18	12.16
December, 1908	31	1,071	38.63	25.46
January, 1909	31	1,066	40.89	25.65
February, "	28	896	34.52	22.97
March, "	31	975	37.51	24.61
April, "	30	918	36.58	24.15
May, "	31	841	34.40	21.98
June, "	30	690	24.60	17.72
July, "	31	551	20.52	13.86
August, "	31	317	13.14	8.78
September, "	30	250	9.09	6.68
October "	31	205	8.26	5.49
November "	15	97	4.26	2.56
Totals	365	8,417	321.58	212.07
Average %			3.82	2.51
No. 111. HOLSTEIN, age 4. Freshened August 22nd, 1908 and September 5th, 1909.				
November, 1908	15	422	14.58	8.86
December, "	31	855	29.02	19.03
January, 1909	31	814	26.86	18.29
February, "	28	721	23.76	16.21
March, "	31	578	21.31	13.89
April, "	30	638	22.43	16.19
May, "	31	452	16.78	11.97
June, "	12	84	3.36	2.60
September, "	25	1,387	43.56	32.43
October, "	31	1,829	60.73	38.07
November, "	15	877	29.81	19.28
Totals	280	8,657	292.20	196.82
Average %			3.37	2.27

	Days Milking.	Milk Lbs.	Fat Lbs.	Casein Lbs.
No. 128. HOLSTEIN, age 8. Freshened November 19th, 1908.				
November, 1908	11	462	14.78	10.62
December, “	31	1,322	43.32	29.05
January, 1909	31	1,395	45.49	28.35
February, “	28	1,078	37.44	23.70
March, “	31	1,178	42.11	27.33
April, “	30	1,096	40.00	25.78
May, “	31	1,076	38.74	25.38
June, “	30	980	34.32	23.20
July, “	31	829	30.08	19.89
August, “	31	361	14.94	10.28
Totals	285	9,777	341.22	223.58
Average %			3.49	2.28
No. 66. AYRSHIRE, age 9. Freshened April 8, 1909.				
November, 1908	15	269	11.97	7.39
December, 1908	31	444	20.38	13.03
January, 1909	31	331	15.64	11.45
February, “	15	107	5.75	3.39
April, “	22	792	29.69	19.
May, “	31	1,201	42.28	28.80
June, “	30	1,090	41.43	26.17
July, “	31	1,050	40.97	24.87
August, “	31	890	33.59	22.93
September, “	30	810	29.72	20.55
October, “	31	755	30.35	20.21
November, “	15	322	13.67	8.36
Totals	313	8,061	315.44	206.25
Average %			3.91	2.55
No. 136. AYRSHIRE, age 6. Freshened August 9th, 1908, and Aug. 25th, 1909.				
November, 1908	15	427	17.92	10.06
December, “	31	831	35.26	20.53
January, 1909	31	785	37.27	22.01
February, “	28	588	24.86	15.61
March, “	31	488	25.27	15.83
April, “	30	456	21.76	13.49
May, “	31	351	17.55	13.52
August, “	5	145	7.25	5.35
September, “	30	990	37.25	26.70
October, “	31	1,092	41.35	26.88
November, “	15	517	20.92	12.64
Totals	278	6,670	286.66	182.61
Average			4.29	2.73
No. 133. AYRSHIRE, age 5. Freshened October 10th, 1908, and October 24th, 1909.				
November, 1908	15	585	20.47	13.13
December, “	31	1,264	44.84	28.79
January, 1909	31	1,252	46.66	29.20
February, “	28	952	33.59	22.78
March, “	31	1,112	41.39	28.65
April, “	30	1,024	41.27	29.25
May, “	31	1,018	40.87	26.65
June, “	30	860	34.62	23.76
July, “	31	534	22.04	14.79
August, “	15	70	2.91	2.13
October “	7	231	7.85	6.93
November “	15	638	21.98	16.87
Total	295	9,540	358.49	242.93
Average %			3.75	2.54

	Milking Days.	Milk Lbs.	Fat Lbs.	Casein Lbs.
No. 131. JERSEY, age 8. Freshened October 9th, 1907.				
November, 1908	15	180	8.35	4.67
December, “	31	380	13.90	10.04
January, 1909	31	352	15.88	9.41
February, “	28	336	15.78	9.47
March, “	31	356	16.90	10.77
April, “	30	346	16.20	10.10
May, “	31	358	16.54	9.16
June, “	30	350	15.99	8.88
July, “	24	160	7.50	4.06
Total	251	2,818	127.04	76.56
Average %			4.50	2.71
No. 129. JERSEY, age 13. Freshened April 30th, 1909.				
November, 1908	15	158	8.44	4.28
December, “	31	342	18.34	9.34
January, 1909	31	341	19.54	10.94
February, “	28	280	15.33	9.38
March, “	16	104	5.91	3.56
May, “	31	852	41.39	22.04
June, “	30	1,000	51.01	25.33
July, “	31	991	51.20	24.78
August, “	31	850	41.51	22.44
September, “	30	640	29.86	18.59
October, “	31	501	23.95	14.02
November “	15	217	10.30	5.96
Totals	320	6,276	316.78	170.66
Average %			5.04	2.71
No. 123. JERSEY, age 5. Freshened Oct. 20th, 1908, and Oct. 9th, 1909.				
November, 1908	15	368	16.52	7.92
December, “	31	675	32.14	16.15
January, 1909	31	599	28.14	16.20
February, “	28	420	20.21	12.23
March, “	31	489	25.52	13.57
April, “	30	450	24.72	13.17
May, “	31	513	28.10	13.44
June, “	30	440	23.99	12.04
July, “	31	370	19.96	10.25
August “	31	165	8.79	4.92
October, “	21	539	24.07	12.56
November, “	15	397	17.67	8.91
Totals	325	5,425	269.83	141.36
Average			4.97	2.60

SUMMARY OF YEAR'S TESTS.

November 16th, 1908, to November 15th, 1909 (inclusive).

No. of Cow.	Days Milking.	Lbs. Milk.	Lbs. Fat.	Lbs. Casein.
HOLSTEINS:				
76	365	8,417	321.58	212.07
111	280	8,657	292.20	196.82
128	285	9,777	341.22	223.58
3 cows	930	26,851	955.00	632.47
Average %..	....	....	3.55	2.35
AYRSHIRES:				
66	313	8,061	315.44	206.25
136	278	6,670	286.66	182.62
133	295	9,540	358.49	242.93
3 cows	886	24,271	960.59	631.80
Average %.	....	....	3.95	2.60
JERSEYS:				
131	251	2,818	127.04	76.56
129	320	6,276	316.78	170.66
123	325	5,425	269.83	141.36
3 cows	896	14,519	713.65	388.58
Average %.	....	....	4.91	2.67
9 cows	2,712	65,641	2,729.24	1,652.85
Average ...	301	7,293.4	4.15%	2.51%

The following points are brought out in the summary of results for the three breeds of dairy cattle:

1. The representatives of the three breeds each milked about the same number of days—930 days for the Holsteins, 896 for the Jerseys and 886 for the Ayrshires, or an average of 301 days per cow for the year.

2. The Holsteins produced most milk, 26,851 lbs., or an average of 8,950 lbs. per cow.

The Ayrshires were a close second with 24,271 lbs.—an average of 8,090 lbs. per cow.

The Jerseys averaged 4,839 lbs. milk per cow, but one of these had not freshened since October 9th, 1907. This cow will freshen the latter part of November, 1909, and ought to make a good showing next year.

The nine cows produced 65,641 lbs. milk, or an average of 7,293 lbs. per cow during the year.

3. The Ayrshires stand first in pounds of milk fat produced during the year, having a record of 960.59 lbs., or an average of 320.19 lbs. per cow. The average percentage of fat in their milk was 3.95.

The Holsteins produced 955 lbs. milk fat, with an average of 318.33 lbs. per cow and 3.55 per cent. in their milk.

The Jerseys produced 713.65 lbs. milk fat, having an average of 237.88 lbs. per cow, and 4.91 per cent. in their milk.

The nine cows produced in the year 2,729.24 lbs. milk fat. The milk contained an average of 4.15 per cent. fat.

4. The Holsteins and Ayrshires produced practically the same weight of milk casein—the one 632.47 lbs., and the other 631.8 lbs., or an average of 210.82 lbs. per cow for the Holsteins and 210.6 lbs. per cow for the Ayrshires. The Jerseys gave 388.58 lbs. casein, or an average of 129.52 lbs. per cow for the year.

The nine cows produced 1,652.85 lbs. milk casein in the year—an average of 183.65 lbs. per cow.

The average percentages of milk casein by breeds was Jerseys 2.67, Ayrshires 2.60, Holsteins 2.35, with an average for all nine cows of 2.51 per cent. for the year.

5. The relation of milk casein to milk fat by breeds for the year is:

Ayrshires.—For each pound of milk casein there was 1.52 lbs. milk fat.

Holsteins.—For each pound of milk casein there was 1.51 lbs. milk fat.

Jerseys.—For each pound of milk casein there was 1.83 lbs. milk fat.

For each pound of milk fat, there was milk casein as follows: Ayrshires, .65 lb.; Holsteins, .66 lb.; Jerseys, .54 lb.

6. In brief, the Holsteins produced most milk and milk casein. The Ayrshires produced most milk fat. The Jerseys gave milk containing the highest percentages of fat and casein. These results are similar to those obtained last year. The percentages of fat and casein were slightly higher for all the breeds this year as compared with last.

Variation in Percentages of Fat and Casein in the Milk of Nine Cows—Three Breeds of Dairy Cattle.

The table shows the extreme variations in the percentages of fat and casein in the milk tested from the individual cows of the three breeds. In the case of No. 136 (Ayrshire) where the extremely high tests of 9.4 per cent. fat and 4.6 per cent. casein are recorded, the cow was sick and gave but 8 lbs. milk that day (March 26th.) The following week (April 3rd) her fat test had dropped to about normal (4.9 per cent.) but her milk still contained a high percentage of casein—4.3 per cent. The following week the tests were 5.2 per cent. fat and 4.1 per cent. casein. The fourth week the percentages of fat and casein were respectively 4.4 and 3.3. After this time her milk tested high in casein, 3.7 to 4.1, until she went dry, May 30th. This cow freshened August 25th. Her first tests (August 29) after this were again high, 5 per cent. fat and 3.7 per cent. casein, but from September 12th to November 15th, her fat and casein tests were normal, ranging from 3.6 to 4.1 per cent. fat and 2.4 to 2.9 per cent. casein.

Most of the other high tests for fat and casein occurred when the cows were nearly dry and the low tests when fresh, although there are some exceptions to the rule. Generally speaking, high fat content and high casein tests are associated together but this is not always the case.

Table Showing Variation in Percentages of Fat and Casein in Milk.

No. and Breed of Cow.	Highest Percentages of		Lowest Percentages of	
	Fat.	Casein.	Fat.	Casein.
111. Holstein	4.3	3.1	3.0	1.9
128. "	6.3	4.7	3.1	2.0
76. "	5.8	3.8	3.5	2.2
136. Ayrshire................	9.4	4.6	3.6	2.4
133. "	4.2	3.1	3.3	2.1
66. "	5.2	4.5	3.3	2.3
123. Jersey	5.7	3.8	4.4	2.1
131. "	5.0	3.2	4.2	2.4
129. "	5.9	3.6	4.1	2.3

Effect of Lactation Period on Percentages of Fat and Casein in nine Cows' Milk During One Year.

Herd No.	Breed.	Lactation	Average p.c. fat in milk by weeks.				Average p.c. casein by weeks.			
			1st.	Last.	31st.	Last 3.	1st.	Last.	1st 3.	Last 3.
111.... .	Holstein	Intermittent...	3.0	4.0	3.13	3.96	1.9	3.1	1.9	2.9
128......	"	"	3.2	6.3	3.26	5.26	2.3	4.7	2.3	3.66
76......	"	Continuous....	3.5	4.4	3.56	4.36	2.2	2.6	2.3	2.6
136... ..	Ayrshire ...	Intermittent ..	5.0	4.8	4.23	4.86	3.7	3.8	3.13	3.8
133.....	"	"	3.4	4.2	3.43	4.23	3.0	3.1	2.73	3.06
66.	"	"	4.2	5.2	3.66	4.93	2.4	4.5	2.4	3.8
123... ..	Jersey......	"	4.4	5.0	4.46	5.26	2.4	3.8	2.33	3.36
131. . . .	"	Continuous....	4.7	4.9	4.63	4.73	2.6	2.8	2.6	2.6
129......	"	Intermittent ..	4.1	5.9	4.36	5.66	2.8	3.6	2.63	3.36
Averages	....	....	3.94	4.96	3.85	4.80	2.7	3.55	2.48	3.23

Comments on Table.

1. The foregoing table indicates an increase of practically one per cent. fat in the milk given by the nine cows during the last week of lactation as compared with the first week; and about the same difference, as the average for the last three weeks of lactation, compared with the first three weeks.

2. The average percentages of casein during the first and last weeks of the lactation period were respectively 2.7 and 3.55, showing an average increase of .85 per cent. in the casein during the last week. The averages of the first three and the last three weeks show a difference of .75 per cent. higher casein in the milk for the latter.

3. These results agree with those obtained last year with the same cows and indicate that the percentages of fat and casein in these cows' milk tend to increase with the period of lactation, but that the fat is higher than the casein in all stages. The average increase of the fat during the last three weeks, over the first three weeks, is about 25 per cent., while for the casein it is 30 per cent.

Table Showing Percentages of Casein in Nine Cows' Milk by Months.

Month.	No. 111. p.c. Casein.	No. 128. p.c. Casein.	No. 76. p.c. Casein.	No. 136. p.c. Casein.	No. 133. p.c. Casein.	No 66. p.c. Casein.	No. 123. p.c. Casein.	No. 131. p.c. Casein.	No. 129. p.c. Casein.	Average p.c. Casein.
January.................	2.23	2.03	2.3	2.8	2.33	3.46	2.7	2.66	3.20	2.63
February	2.25	2.20	2.57	2.65	2.40	3.90	2.92	2.82	3.35	2.78
March	2.45	2.32	2.52	3.27	2.57	......	2.97	3.02	3.45	2.82
April..................	2.55	2.35	2.62	3.85	2.85	2.4	2.95	2.95	......	2.81
May	2.68	2.36	2.62	3.84	2.62	2.4	2.62	2.56	2.60	2.70
June	3.1	2.33	2.56	......	2.76	2.4	2.73	2.53	2.53	2.61
July	......	2.40	2.50	......	2.76	2.36	2.76	2.60	2.50	2.55
August	......	3.24	2.82	3.7	3.06	2.60	3.12	......	2.64	3.02
September	1.92	. ....	2 73	2.7	......	2.53	......	......	2.90	2.55
October.................	2 08	... ..	2.70	2.46	3.0	2.68	2.33	....	2.80	2.57
November.	2.15	2.3	2.45	2.4	2.45	2.60	2.20	2.60	2.72	2.43
December...............	2.22	2.2	2.37	2.45	2.27	2.95	2.40	2.65	2.75	2.47

COMMENTS ON TABLE, SHOWING PERCENTAGES OF CASEIN BY MONTHS.

1. Taking the averages by months we find that these nine cows produced milk containing the highest percentages of casein during August, March and April. Last year these cows produced the highest casein averages during May, June and July. So far, these results do not show any constant influence of season on the percentage of casein in the milk. It is probable that the period of lactation is a more important factor than the season of the year, with reference to effect upon the percentage of casein in cows' milk.

2. From June to October the cows were on pasture and receiving a small portion of bran and "Molac" in the stable. The remainder of the year they were chiefly in the stable receiving hay, corn silage, mangels and meal. There is nothing in the results to indicate that pasture or stable conditions have any effect on the percentage of casein in cow's milk, although it would be advisable to withhold judgment on this point until we have more data.

FAT AND CASEIN IN INDIVIDUAL PATRON'S MILK DURING SEASON, 1909.

We aimed to take one sample per week during the cheese season from the milk as delivered by about ten patrons. This is a continuation of the work done last year. A large amount of data has been accumulated on this point. We present a summary as follows:

Patron.	April.		May.		June.		July.		Sept.		Oct.		Season.	
	Fat.	Casein	Fat.	Casein	Fat.	Casein	Fat.	Casein	Fat.	Casein	Fat.	Casein	Fat.	Casein
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
No. 1	3.63	2.3	3.92	2.42	3.84	2 46	3.52	2.12	3.86	2.46	4.5	2.77	3.88	2.42
" 2	3.53	2.16	3.67	2.42	3.46	2.28	3.25	2.15	3.58	2.36	3.77	2.46	3.54	2.30
" 3	3.76	2.16	4.12	2.55	3.66	2.38	3.77	2.2	4.14	2.64	4.86	2.86	4.05	2.46
" 4	4.16	2.43	3.87	2.37	3.60	2.36	3.47	2.47	4.22	2.84	4.56	2.96	3.98	2.57
" 5	3.56	2.46	3.52	2.52	3.62	2.44	3.65	2.12	3.46	2.40	3.53	2.3	3.55	2.37
" 6	3.53	2.36	3.67	2 35	3.68	2.34	3.85	2.27	4.38	2.88	4.26	2.93	3.89	2.52
" 7	4.46	2.30	4.07	2.50	3.78	2.46	3.82	2.17	4.20	2.80	4.46	2.73	4.08	2.45
" 8	3.60	2.33	3.47	2.37	3.30	2.38	3.35	2.17	3.82	2.58	4.86	2.93	3.73	2.46
" 9	....	.....	3.73	2 40	3.56	2.38	3.56	2.27	3.48	2.44	3.63	2 63	3.59	2.42
" 10	....	.....	....	.....	3.04	2.28	3.02	2.07	3.14	2.34	3.26	2.36	3.11	2.26
" 11	....	.....	....	.....	....	.....	3.37	2 07	....	.....	....	.....	3.37	2.07
Average of all	3.78	2.31	3.78	2.43	3.55	2.37	3.51	2.19	3.79	2.55	4.16	2.69	3.76	2.42

The results from testing individual patron's milk agree with the vat tests in finding the highest percentages of casein in the milk delivered during May (2.43), September (2.55) and October (2.69). Among nine patrons who sent milk during most of the season we find a variation in the average fat content of the milk of 3.11 to 4.08, and of casein from 2.26 to 2.57. The lowest average percentage of casein was found in the milk testing lowest in fat, but the highest average percentage of casein in the milk for the season (2.57) was that furnished by Patron No. 4, whose milk tested an average of 3.98 per cent. fat. Leaving out patrons Nos. 9, 10 and 11, who did not send milk for the entire season, we have 2.30 per cent. casein and 3.54 per cent. fat as the lowest averages; 2.57 per cent. for casein and 4.08 per cent. for fat as the highest averages, these being found in milk furnished by two different patrons.

COMPARATIVE TESTS ON THE INFLUENCE OF CASEIN IN MILK ON THE WEIGHT AND QUALITY OF CHEESE.

Last year we reported on this test as follows: "The average difference in the percentage of casein in the milk of the two vats was but .14 per cent.—not sufficient, one might think, to make any appreciable difference in the yield and quality of the cheese, but the average yield of marketable cheese per 1,000 lbs. milk was 88.4 lbs. from the low casein milk and 94.5 lbs. from the high casein lots—a difference of 6.1 lbs."

While to some extent this difference is accounted for by the higher fat content (3.75 per cent.) in the higher casein milk, as compared with 3.51 per cent. fat in the milk of lower casein content, this difference in fat does not explain the whole increase.

During the season of 1909 fourteen experiments were made in which 8,232 lbs. milk, testing an average of 3.7 per cent. fat and 2.49 per cent. casein, were manufactured into cheese. The average percentage of fat in the whey was .232.

Similar lots of milk weighing 8,077 lbs., and testing 3.53 per cent. fat and 2.34 per cent. casein were made into cheese on the same days as were the lots of milk having a higher fat and casein content. The average percentage of fat in the whey was .21.

The average yield of cheese per 1,000 lbs. milk was 93.9 lbs. from the higher casein lots and 90.32 lbs. from the lower testing vats. There were required 10.63 lbs. milk to make a pound of cheese in the first case and 11.07 in the latter.

The moisture content of curds and cheese were very similar in both cases as shown in the table:

——	Dipping.	Green Cheese.	Ripe Cheese.
High Casein	50.6%	35.16%	34.8%
Low Casein	50.6%	35.23%	35.04%

The quality of the cheese was also quite similar in both lots as seen in the table of average scorings:

	Flavor.	Closeness.	Even Color.	Texture.	Total.
	(40)	(15)	(15)	(20)	(100)
High casein.	35.33	13.86	14.03	17.63	90.86
Low "	35.46	13.76	14.03	17.80	91.03

Conclusions: A slight increase in the percentage of casein in the milk for cheesemaking appears to have quite a marked effect on the yield of cheese. Up to the present we have not been able to get milk containing a higher percentage of casein without also containing an increased percentage of fat, hence, we are unable to ascertain the effects of increased casein alone in normal milks. Were we to add or remove cream to equalize the fat content it would destroy the natural relation of fat to casein and make the test of little use in a study of the effect of a natural increase or decrease in the casein content of milk on the yield and quality of cheese. Last year an increase of .14 per cent. casein and .24 per cent. of fat in the milk caused an increased yield of over six pounds of cheese per 1,000 lbs. milk. This year an average increase of .15 per cent. casein and .17 per cent. fat in the milk gave an averaged increase yield of 3.58 lbs. cheese per 1,000 lbs. milk.

There appears to have been very little difference in the quality of the cheese as indicated by the relative scorings.

Casein is an important factor in determining the cheese-producing capacity of milk.

VAT TESTS OF FAT AND CASEIN DURING SEASON.

During the seasons of 1908 and 1909 we tested the vats of milk furnished by about ten patrons to the cheese room, as often as possible for fat (Babcock method) and for casein (Hart method). The average percentages of fat and casein in the vats tested in 1908 were 3.67 and 2.39 respectively. In 1909 the averages were 3.6 and 2.5 respectively for fat and casein. The fat averaged practically the same as last year, while the casein is about one-tenth of one per cent. higher. The results by months are shown in the table:

Month	No. Tests Made.	Per cent. Fat in Milk.		Per cent Casein		Av. lbs. Cheese. Per lb.	
		Range.	Average	Range.	Average	Fat.	Casein.
1909.							
April..........	11	3.4 to 3.8	3.58	2.3 to 2.6	2.38	2.47	3.75
May....	13	3.4 to 3.9	3.68	2.1 to 2.7	2.43	2.48	3.75
June.............	21	3.2 to 3.6	3.42	2 1 to 2.7	2.40	2.70	3.84
July..............	24	3.2 to 3.6	3.42	2.1 to 2.5	2.30	2.64	3 92
August........ .	11	3.5 to 3.8	3.61	2.2 to 2.7	2.34	2.55	3.92
September........	22	3.5 to 4.2	3.81	2.2 to 2.8	2.61	2.55	3.74
October	6	3.9 to 4.2	4.08	2.5 to 2.8	2.67	2.48	3.80

In 1908 the highest percentages of casein in the vats of milk in our cheese room were during the months of June, September and October. The results are similar for this year, except that the May milk is slightly higher than for the month of June. This is probably due to the higher average percentage of fat in the May milk. As a general rule, we find that milk testing high in fat tests higher in casein than does milk with a lower percentage of fat, although the increase in casein is not in exact ratio to the increase in fat.

RELATION OF CASEIN IN MILK TO YIELD AND QUALITY OF CHEESE BY MONTHS, 1909.

These experiments are a continuation of the work done last year. During the past season, April to October, we used 33,996 lbs. milk for the tests, which averaged 3.67 per cent. fat and 2.39 per cent. casein. The average percentage of fat in the whey was .225. The average pounds of cheese per pound of fat in the milk was

2.56; per pound of casein, 3.91. The average pounds of milk to make one pound of cheese was 10.64. There was made an average of 93.9 lbs. cheese per 1,000 lbs. milk. The average percentages of moisture in the curd at dipping, in the green, and in the ripe cheese were 49.67, 35.37, and 34.62 respectively. The cheese scored an average of 91.2 points out of 100. One experiment was made each week during the season except for the month of August, when but two tests were conducted—one at the beginning and one at the end of the month.

The chief points in the work may be summarized in the following table:

TABLE SHOWING RELATION OF FAT AND CASEIN TO YIELD OF CHEESE BY MONTHS.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.
Lbs. milk used................	3,569	5,959	6,241	5,474	2,836	6,184	3,733
Percentage fat in milk.........	3.6	3.73	3.53	3.41	3.6	3.8	4.1
Lbs. fat in milk	128.86	222.41	220.86	187.07	102.08	234.06	153.07
Average percentage casein.....	2.36	2.40	2.37	2.19	2.24	2.52	2.63
Lbs. casein in milk.......	84.38	144.40	147.97	119.85	63.78	156.24	98.39
Average percentage fat in whey	.24	.23	.19	.20	.22	.22	.26
Lbs. cheese made..............	316.38	548.19	606.44	496.56	256.13	595.75	375.25
Lbs. cheese per lb. fat in milk..	2.45	2.46	2.74	2.65	2.50	2.54	2.45
Lbs. cheese per lb. casein in milk	3.74	3.79	4.09	4.14	4.01	3.81	3.81
Lbs. milk per lb. cheese........	11.2	10.8	10.2	11.2	11.0	10.3	9.9
Lbs. cheese per 1,000 lbs. milk.	88.6	91.9	97.1	90.7	90.3	96.3	100.5

The foregoing table shows:

1. The highest average percentages of fat and casein were found in the milk during the months of September and October.

2. The greatest yield of cheese per pound of fat in the milk was in the month of June (2.74 lbs), and the least in April and October (2.45 lbs.).

3. The greatest yield of cheese per pound of casein in the milk was in July (4.14 lbs.), and the least in April (3.74 lbs.).

4. It required 11.2 lbs. milk to make a pound of cheese during April and July, while in October but 9.9 lbs. were required.

5. The greatest yield of cheese per 1,000 lbs. milk was in October (100½ lbs.), and the least in April (88.6 lbs.).

6. The percentage of fat in the whey was fairly uniform throughout the season at about .2.

7. Theoretically, fat and casein in the milk should govern the yield of cheese; practically, this is not always the case, as shown by the table in the month of June, where milk with comparatively low percentages of fat and casein produced a comparatively high yield of cheese, both relatively to fat and casein and absolutely per 1,000 lbs. milk.

EFFECT OF ACID AT DIPPING ON CURDS NOT STIRRED AND STIRRED SLIGHTLY.

In order to see what effect, if any, there might be from not stirring curds or stirring them slightly and having one vat dipped sweeter than the other, eight experiments were conducted in which 4,788 lbs. milk testing an average of 3.46 per cent. fat, were divided equally between two vats after thorough mixing in a larger vat. The vats were treated as nearly alike as possible, except that the A vats were dipped with an average of .172 per cent. of acid, while the B vats had .192 per cent. acid. The acidity at milling and salting were quite similar on both curds.

averaging about .8 per cent at milling and 1 per cent. at salting. Both lots showed about the same loss of fat in the whey, which tested .202 per cent. fat in the A lots and .204 in the B lots.

The percentages of moisture in the curds at dipping, in the green and ripe cheese were:

——	Dipping.	Green cheese.	Ripe cheese
A	55.50	36.7	36.2
B	54.55	36.3	36.0

The A lots produced an average of 93.1 lbs. cheese per 1,000 lbs. milk. The B lots averaged 92.82 lbs. cheese per 1,000 lbs. milk. The A cheese scored 35.87 points in flavor and a total of 91.62; the B lots scored an average of 35.38 in flavor and 91 for total.

The results show a slightly increased yield of cheese and a little better quality of cheese by dipping the unstirred or slightly stirred curds with an average of .172 per cent. acid as compared with dipping at an average of .192 per cent. acidity. Further experiments are needed before definite conclusions may be drawn.

STIRRING VS. NOT STIRRING CURDS AT THE TIME OF DIPPING—ACID SAME IN BOTH VATS.

This work is a continuation of that done in 1908. Fifteen experiments were made by using 8,753 lbs. milk testing an average of 3.53 per cent. fat in the A vats of which the curds were not stirred. An equal weight of similar milk was made into cheese in the B vats, the curds of which were stirred "dry" at the time of dipping. The percentages of fat in the whey were .203 and .206 respectively from the A and B vats.

The average percentages of acid and moisture in the curds at dipping and of moisture in the cheese were:

	Average % Acid at			Average % Moisture in		
	Dipping.	Milling.	Salting.	Curd.	Green Cheese.	Ripe Cheese.
A	.187	.805	1.03	55.64	36.32	35.92
B	.187	.746	.977	50.56	35.64	35.20

The average yield of cheese per 1,000 lbs. milk from the A lots not stirred was 93.7 lbs.; and from the B lots stirred "dry," 93.01 lbs. The average score of the cheese from the two lots was:

	Flavor.	Closeness.	Color.	Texture.	Total.
	(40)	(15)	(15)	(20)	(100)
A	35.46	14.06	14.03	17.80	91.36
B	35.60	13.86	14.	17.83	91.30

Last year the yield of cheese per 1,000 lbs. milk was increased .4 lb. by not stirring the curds at dipping. This year the increase was .7 lb. by not stirring. In both years there was little or no difference in the quality of the cheese by following the two methods.

Conclusion.

The results of two years' tests gave an increased yield of cheese of over one-half pound per 1,000 lbs. milk by not stirring the curds after or at the time of dipping and this with no deterioration in the quality of the cheese. Cheesemakers may try the method on a small scale and note results. The advantages are, less labor and a greater yield of cheese.

ONE VAT DIVIDED AT TIME OF DIPPING—(A) CURD NOT STIRRED, (B) STIRRED.

These experiments are a continuation of the work done last year. Thirteen experiments were conducted in which 19,525 lbs. milk testing an average of 3.71 per cent. fat were used. The whey tested an average of .215 per cent. fat. The milk was treated in the usual way up to "dipping" time, when the curds had an average of .185 per cent. acid. Each curd was now divided into two nearly equal parts, but not weighed, one of which (A) was not stirred, while the other (B) was stirred "dry" or until it contained about 50 per cent. of moisture.

The main results are shown in the table:

Per cent. acid at		Per cent moisture in			Lbs. ripe cheese.	Per cent. shrinkage.	Score.
Milling.	Salting.	Curd.	Green Cheese.	Ripe Cheese.			
(A) .772	1.01	57.47	36.3	35.6	900.02	3.33	91.1
(B) .72	.96	50.50	35.6	34.8	956.08	3.12	91.3

The results are similar to those obtained last year and indicate:

1. A slightly greater and more rapid development of acid on the curds not stirred.

2. The curds not stirred contained at dipping about seven per cent. more moisture than those stirred in the usual way.

3. The green and ripe cheese from the unstirred curds contained respectively .7 and .8 per cent. more moisture as compared with those stirred in the usual way. There was also slightly more shrinkage in the cheese from curds not stirred.

4. There was little difference in the quality of the cheese.

Conclusion.

The results of two years' experiments indicate clearly that there was little or no difference in the quality of the cheese where the curds were not stirred as compared with curds from the same vat of milk which were stirred in the usual way.

Moisture in Curd and Cheese—Samples from College Cheesery.

Between April 26th and July 23rd the moisture was determined (mostly in duplicate) in sixty-four samples of curd, same number of green cheese and fifty-six samples of ripe cheese from the cheese branch of the College Dairy department. The milk for this work was purchased from farmers in the vicinity of Guelph. The moisture determinations here reported were made in a high pressure steam oven from normal curds in connection with the experimental cheese work done during the season. The relation of moisture in curds and cheese to the quantity and quality of cheese made in the experiments will be discussed in connection with the details of the various lines of investigational work. At present, we shall merely give a summary of the work as it relates to the moisture found in normal curds and cheese at the College, together with a summary of the results from samples sent to us by the Western Ontario Cheese Instructors.

The average percentages of moisture in the College samples tested were:

Curd at dipping, 50.836; green cheese, 35.526; cheese one month old, 35.005.

The foregoing averages of thirty-eight samples do not include the results from those curds at dipping which were not stirred, but represent fairly well the average moisture content in the curd and cheese of the College dairy during the season of 1909.

Moisture in Curd and Cheese from Western Ontario Factories.

In addition to the moisture determinations made of curds and cheese produced at the College, we arranged for samples to be sent in by each of the Cheese Instructors in Western Ontario during the season of 1909. Owing to difficulty and delay in securing a proper mailing bottle and case for the samples it was about the middle of July before the work was fairly started, although Instructor McKay began sending samples so early as May 26th. The last samples were received September 23rd. From the six Instructors (Messrs. Burgess, Gracey, Green, Hart, McKay and Travis) we received 33 satisfactory samples of curd and 45 samples of green cheese. A few samples had apparently leaked during transit and these are not included in the result. The samples of curd were taken at the factory after dipping and when the cheesemaker had stirred them to that condition known as "dry." The green cheese samples were taken from these same curds after they had been pressed over night. The moisture was determined in a high pressure steam oven which was fully described, together with the method used for determining the moisture, in my report for last year (1908).

The following cheese factories in Western Ontario contributed samples of curd and cheese: Donegal, Harriston, Wallace, Fordwich, Maitland, Newry, Molesworth, Galabank, Dorchester, Keyser, Canboro, Bismark, Boston, Lynden, Fork's Road, Virtue, East and West Oxford, Culloden, Norwich Gore, Verschoyle, Kintore, North Oxford, Innerkip, Black Creek, Fullerton, Avonbank, Ballymote, Thamesford, Hickson, Innerkip, North Branch, Bennington, Springford, Walsh, Dunboyne and Summerville. (*Note.*—In a few cases we did not receive name of factory along with sample. Instructors are arranged alphabetically and name of factories in each group according to date of receiving sample. More than one sample was received from a few factories.)

The following table summarizes the percentages of moisture found in the samples from the six groups of factories:

Name of Instructor.	Percentage of Moisture in					
	Curd at Dipping.			Green Cheese.		
	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.
J. R. Burgess..................	44.4	40.4	41.920	35.0	32.8	33.571
A. E. Gracey......................	42.8	38.4	40.160	34.8	33.2	34.133
R. H. Green	41.2	40.0	40.800	34.4	32.8	33.533
E. N. Hart........................	44.2	42.0	43.200	34.80	32.0	33.383
Alex. McKay	44.4	39.2	41.075	36.4	33.2	34.493
Geo. Travis	43.6	40.0	41.520	35.2	33.6	34.280
Average of all........	....	....	41.445	....	....	33.898

We consider the foregoing rather a remarkable showing of uniformity in moisture content for both curd and cheese. Out of thirty-three samples of curd sent in by the six Instructors, the extreme variations of individual samples are from 38.4 to 44.4, while the averages of the samples sent in by the Instructors vary only from 40.16 to 43.2. Among the cheese samples we have individual sample variations from 32 to 36.4, while the averages vary from but 33.383 to 34.493.

We should have liked samples of ripe cheese from these same curds, but did not find it practicable to obtain them.

Comparing the results of the moisture content in the thirty-eight samples of College curds and cheese with those found in thirty-three samples of curd from Western Ontario factories we find that the curds from the factories averaged 41.445 per cent. moisture at dipping, while our own averaged 50.836 or 9.391 per cent. higher. The forty-five samples of green cheese from the factories averaged 33.898 per cent. moisture, while the College green cheese averaged 35.005 per cent., or over one per cent. higher.

We have pointed out at various times that in our judgment cheesemakers go to more trouble than is necessary in stirring curds, and that they reduce the moisture content of their curds and cheese to a greater extent than is advisable in the making of fine Cheddar cheese. It is possible that in factories where the temperature of the ripening (curing) room runs above 70 degrees F. for any length of time, there might be some danger in having 35 to 36 per cent. of moisture in the green cheese, but in those factories where the temperature is fairly well under control, we believe that the moisture content could be increased in Western Ontario cheese by one or two per cent. with advantage. It would mean less pounds of milk to make a pound of cheese, thus making a better "average," and the cheese would suit the customer better, as no one cares for "dry," "bony" cheese. It would be no injustice to the consumer, because the moisture in the cheese is the natural water of milk, having dissolved in it sugar, mineral matter, and albuminoids, all of great food value.

We hope to continue this work during another season in order to obtain more data from a larger number of factories.

Moisture in Curd From One Vat Not Stirred.

Four experiments were made in which altogether 10,468 lbs. milk, testing an average of 3.38 per cent. fat were made into cheese with little or no stirring of the curd at the time of dipping. The weights of milk in the individual vats varied from 2,300 to 2,900 lbs. The percentage of fat in the whey averaged .2. The percentage of acidity at dipping, milling and salting averaged .195, .75 and .955 respectively. The yield of cheese averaged 90.3 lbs. per 1,000 lbs. milk. The average score of the cheese was 90.75 out of 100. The average percentage of moisture in the curd at dipping was 52.5; in the green and ripe cheese 35.5.

The results are similar to those of last year, indicating that good cheese may be made from good-sized vats of milk without the stirring of curds at the time of dipping which is usually considered necessary.

We are unable to explain why the green and ripe cheese should apparently contain the same percentages of moisture. In all our work the difference in moisture content of "green" and "ripe" cheese is seldom more than one-half of one per cent., yet the cheese usually shrink two or three per cent. in weight during one month. Is this shrinkage entirely due to loss of moisture or is it due partly to gases resulting from the ripening process? Or are methods of sampling and determining moisture in cheese faulty? At present we are unable to answer these questions.

Milk Solids Lost in Making Overripe Milk into Cheese.

This is the third year in which experiments have been conducted to ascertain the loss from allowing milk to become overripe or partly sour for cheesemaking. We have found considerable difficulty in conducting these experiments in a satisfactory manner. This year the lots made from overripe milk were chiefly manufactured on Mondays during hot weather, so as to have the conditions similar to those found at cheese factories. The normal lots were taken on the following day. In this way we aimed to have results comparable with what might be expected at cheeseries.

During the season, six experiments were made in which 13,122 lbs. of overripe milk were used. This milk tested an average of 3.53 per cent. fat, and 2.43 per cent. casein. The whey contained an average of .236 per cent. fat. The weight of milk varied from 1,900 to 2,800 lbs. for each test.

The normal lots of milk (7,744 lbs., total) averaged 3.49 per cent. fat, and 2.32 per cent. casein. The whey from these lots averaged .216 per cent. fat. The weight of milk for each experiment varied from 1,000 to 1,500 lbs.

The lots of overripe milk remained in the whey for an average of one hour and six minutes. The normal curds were in the whey two hours and forty-nine minutes. The average percentages of moisture in the curds at dipping, in the green and ripe cheese were:

——	Dipping.	Green Cheese.	Ripe Cheese.
Overripe milk..................	50.9	35	35
Normal milk	49.6	35	34.6

The overripe milk yielded an average of 90.5 lbs. ripe cheese per 1,000 lbs. milk, while the yield from the normal lots was 91.5 lbs. per 1,000 lbs. milk.

The yield of cheese per pound of fat and casein in the milk was 1.516 lbs. from the overripe lots and 1.57 from the normal.

The pounds of milk required to make a pound of cheese were 10.9 from normal milk and 11.04 from the overripe lots, although the latter were slightly richer in both fat and casein.

The quality of the cheese is indicated by the following average score:

——	Flavor. (40)	Closeness. (15)	Even Color. (15)	Texture. (20)	Total. (100)
Normal lots	35.83	13.66	14.25	17.70	91.41
Overripe lots	35.66	14.33	14.33	18.25	92.50

Conclusions.

1. Last year the normal milk lots produced an average of 2.7 lbs. cheese more per 1,000 lbs. milk than did similar lots of overripe milk. This year the increased yield of cheese was one pound per 1,000 lbs. milk from the normal as compared with overripe milk. The experiments of both years show a decided loss of cheese by allowing the milk to become overripe or partly sour. This loss at a factory receiving daily from 10,000 to 20,000 lbs. milk would amount to from about 10 to 20 lbs. cheese, worth from one to two dollars daily. There is great need that patrons understand the importance of delivering milk in a sweet condition at cheese factories.

2. So far as the quality of the cheese is concerned the results indicate that a skilful maker can make good cheese out of overripe milk, but with the average cheesemaker there is likely to be a poorer quality of cheese made from overripe milk.

FINE VS. COARSE WIRE CURD KNIVES.

These tests are a continuation of the work done last year in which we reported that the curds cut with the coarser (3-8 inch) knife gave a greater yield of cheese and that it was difficult to account for this increased yield by using the knife with greater distance between the wires, unless it were due to an increased amount of moisture in the cheese.

During the season of 1909 thirteen experiments were made in which were used 14,334 lbs. milk testing an average of 3.57 per cent. fat. The whey from the curds cut with the 1-4 inch knife tested an average of .224 per cent. fat, and that from the 3-8 inch knife tested an average of .228.

The milk for each experiment was mixed in one vat, coloring and culture were added, then it was divided between two vats. Both vats of milk were cut once, after coagulation, with a 3-8 inch horizontal blade knife, then each was cut twice with one of the perpendicular wire knives.

The vats cut with the 1-4 inch wire knife gave an average yield of 92.5 lbs. of ripened cheese per 1,000 lbs. milk. Those cut with the 3-8 inch knife produced an average of 92.8 lbs. cheese per 1,000 lbs. milk—an average increase of .3 lb. cheese per 1,000 lbs. milk. Last year the 3-8 inch knife gave an average increase of .4 lb. cheese per 1,000 lbs. milk. The shrinkage during one month was 2.96 per cent. from those cheese made by using the 1-4 inch knife and 2.95 per cent. from cheese where the curds were cut with the 3-8 inch knife.

PERCENTAGES OF MOISTURE AND SCORE OF CHEESE.

—	Percentage Moisture.			Total Score.
	Dipping.	Green Cheese.	Ripe Cheese.	
¼ inch knife............	51.7	36.2	35.2	90.7
⅜ inch knife............	53.4	36.35	35.8	90.2

Conclusions.

1. In both years the percentages of moisture in the ripened cheese by using the coarse horizontal knife (3-8 inch) was slightly greater.

2. In both years the yield of cheese by using the coarser knife was slightly greater.

3. There was very little difference in the quality of the cheese made by using these two kinds of knives for cutting the curd.

4. So far as these experiments indicate, they point to the advisability of using the coarser knife (3-8 inch) for ordinary curds. There may be an advantage in using the finer knife in special cases, such as when handling overripe milk, but considering yield and quality of cheese for regular factory work the results are in favor of using the coarser (3-8 inch) knife.

WHEY AND WHEY BUTTER EXPERIMENTS.

Last year we made a full report on the whey butter question so it will not be necessary to give more than brief details of the work done during the past year.

As in 1908, the Animal Husbandry Department co-operated with us in hog-feeding experiments. We furnished three kinds of whey for these tests, viz.:

Ordinary whey taken directly from the vat.

Whey from which the fat had been extracted with a cream separator but not pasteurized.

Ordinary whey pasteurized to a temperature of about 156 degrees F. (For results of these feeding tests, see Report of Prof. Animal Husbandry.)

Owing to the fact that practically all our whey was used for these feeding experiments, there was not sufficient for us to carry on churning tests satisfactorily after June 10th, when the feeding tests began.

During the latter part of April and early part of May, four churning trials were made by separating the whey from 5,554 lbs. milk, testing an average of 3.84 per cent. fat. There were about 5,000 lbs. whey from this milk, testing an average of .26 per cent. fat. The whey cream tested 30 per cent. fat. In three cases the cream was pasteurized, culture added and ripened, and in one case it was not pasteurized, but allowed to ripen naturally. The weight of butter made from the 5,000 lbs. whey was 12.05 lbs., or an average of 2.41 lbs. butter per 1,000 lbs. whey. Last year we made an average of 2.675 lbs. butter per 1,000 lbs. whey. The average for the two years is practically 2 1-2 lbs. butter per 1,000 lbs. whey.

The table shows the quality of the butter as indicated by scorings when fresh, when one month, and when six months made:

Kind of Butter.		Flavor (50)	Grain (20)	Color (15)	Salt (10)	Package (5)	Total (100)
Pasteurized Whey Cream (3 lots).	Average 1st scores............	44	18.2	13.6	9.5	5	90.4
	" 2nd " (1 month)....	43	18.2	14.1	10	5	90.4
	" 3rd " (6 months) ..	36.3	19	14.3	10	5	84.6
Not Pasteurized (1 lot).	1st score	40	18	14	10	5	87
	2nd " (1 month)............	38	18	14	10	5	85
	3rd " (6 months)	20	18	10	10	5	63

The results indicate very fair quality of the pasteurized lots of butter when made and show also very fair keeping quality—in fact equal to average creamery butter.

The lot made from unpasteurized cream and allowed to ripen naturally, was the poorest in quality and went off in flavor very badly at the end of six months. It would be almost impossible to sell this butter, after keeping six months in a refrigerator at a temperature of about 40 degrees F. It will be noticed that the "grain" and "color" of the pasteurized lots seemed to improve with keeping.

Conclusion.

Very fair butter can be made from the fat of whey and it possesses fairly good keeping quality when the cream is pasteurized. However, it is not likely to pay, except in large factories and when butter is dear in price.

All of which is respectfully submitted.

H. H. DEAN.

PART X.

THE PROFESSOR OF BACTERIOLOGY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit the following report upon the work of this department during the year ending November 30th, 1909.

INSTRUCTION. Aside from the instruction as outlined in the regular and short-course announcements, ten lectures on bacteria as related to agricultural science were delivered to the special Normal class last spring.

PUBLICATIONS AND SPECIAL LECTURES. During February, Bulletin 169 was published by the Department of Agriculture. This bulletin gives a resumé of work done at this College upon nitrogen accumulation by legumes, and includes morphological and cultural studies of the nitrogen-accumulating bacteria, as well as the results of the distribution of cultures of these bacteria for the inoculation of seed during the years 1905 to 1908 inclusive.

Two press bulletins were prepared, and several articles were contributed gratis to agricultural papers in Ontario and the United States.

A paper giving a resumé of results in seed inoculation by Canadian farmers during 1908 was read before the annual meeting of the Experimental Union in December. A paper on the "Bacterial Contamination of Milk" was presented before the Ontario Women's Institute convention for 1908. A paper on the "Keeping Quality of Butter" was prepared for the annual meeting of the Western Ontario Dairymen's Association at Brantford in January. An illustrated lecture on "Tuberculosis Among Farm Animals," was delivered in the Guelph City Hall during the Provincial Tuberculosis Exhibit in March. An address on "How Bacteria Help the Farmer" was delivered before the annual meeting of the North Waterloo Farmers' Institute in June.

RESEARCH. In collaboration with a representative from the United States' Department of Agriculture, some work was done during the summer upon the problem of so-called "White Diarrhœa" of chicks. While some valuable data were secured, yet no definite conclusions could be drawn as to the cause of this trouble among incubator chicks.

At the request of Mr. **Frank Herns**, Chief Dairy Instructor for Western Ontario, I spent some time in a study of the yeasts found in unpasteurized whey, with a view to giving cheesemakers further aid in avoiding "off" or undesirable flavors in cheese. This study is still in progress.

Further observations on tuberculosis in fowls have been made, as noted elsewhere in this report. Later on, if conditions seem to warrant, such data as we have collected will be prepared for publication in bulletin form.

LABORATORY ANALYSES.

A summary of the work in the examination of material sent to us by farmers and others shows an increase in this work over last year.

Much of the material received consists of specimens from animals or plants showing indications of disease; of water and milk samples to be examined for potability or purity, etc. When such materials are received an examination is made, the difficulty determined if possible, and a report is made to the sender, stating the cause of the trouble and the measures to be adopted in dealing with it. Much of the work is routine in its nature, though occasionally interesting, and valuable specimens for museum purposes and for class demonstration are received. All is of value to the farmer. A summary follows of such work for the year just closed, the materials, for convenience for reference, being arranged alphabetically.

ANTHRAX. In all, six cases of suspected anthrax have come to our notice. Three were samples of blood from cows, in two of which anthrax was demonstrated. Portions of spleen from two cows were examined and anthrax demonstrated in one. The blood and spleen from a horse gave negative findings. Two samples of water suspected of anthrax contamination were examined and the anthrax bacteria found in one sample.

BUTTER PAPER. One sample of butter paper said to be mouldy was examined, and mould found thereon. Soaking of the butter paper in three per cent. formalin, and paraffining the boxes was recommended as a preventive.

CHEESE. One sample of cheese, said to have a bitter flavor was examined, but no organism responsible for the condition was found in the sample.

CURD. One sample of slimy curd and one sample of curd said to have coagulated before adding rennet were received. The use of a pure lactic acid starter was recommended in each case.

DIPHTHERIA. Four blood serum cultures from the human throat were examined for suspected diphtheria with negative results in all cases.

DUCKLINGS. Four dead ducklings were examined and the cause of death diagnosed as intestinal coccidiosis.

FOWLS. Aside from fowls affected with tuberculosis as described below, there were examined seventeen fowls. Of these a number died of various causes not of an infectious nature, and some on autopsy appeared perfectly normal, the senders of these evidently having suspected disease where it was not present.

FRUIT. One sample of spoiled canned pears was sent by one of the commercial canneries of the Province. On opening the cans, the fruit had black specks over the top, appearing like particles of dirt. The trouble was caused by the use of too much flux in the solder.

HOG CHOLERA. We were called upon during the year to investigate three outbreaks of hog cholera.

MILK. In all, twenty samples of milk were submitted for examination and various conditions found. Two samples were from farmers who stated that the cream became "frothy" or "foamy" on attempting to churn it. In both samples, yeast was found to be the cause of the condition. Trouble of this kind can usually be overcome by especial care in having all milk utensils thoroughly scalded and in using for a time a pure lactic acid starter such as is used by creamery buttermakers.

ROPY MILK. One condition of milk that is sometimes troublesome is ropiness or sliminess in milk or cream.

During the past year we have had brought to us for investigation several bad cases of ropy milk. Each case was presented by a farmer whose farm was situated near a city in which he peddled the milk from twenty-five to thirty cattle, each having a good business, and each rapidly losing his customers, because the milk if kept a few hours would become viscid, slimy or ropy, apparently altogether unfit for use and disgusting to handle. This condition of the milk brought about a serious financial loss to these farmers, a loss which was increasing from day to day, and after trying their utmost to solve the problem they were almost in despair of finding a remedy, when they brought the matter before our notice to see if we could do anything for them. We were able in each instance to find the cause and to suggest a simple remedy, which, if put into practice, would entirely do away with the mischief.

Although it is possible for this condition of milk to occur at any time of the year, the season when it appears to be most prevalent is during the summer or early autumn months.

Although it is possible for cattle suffering from inflamed udders or garget to produce slimy milk, we proved conclusively in each case investigated that it was not any disease in any of the cattle that was the cause of the ropy milk trouble. In fact, this kind of ropy milk is not caused by a disease-producing germ, but by one that lives in water, soil, ice or other materials, and is not at all dangerous from a health standpoint, either for animals or man. So that this kind of ropy milk is not caused by a diseased condition of the cow, nor will it cause any disease in man.

The germ that causes the trouble is known to bacteriologists as *bacillus lactis viscosus,* that is, the germ which makes milk viscid. It lives indefinitely and multiplies in water containing organic matter. Some districts are troubled with it and others are not. We may liken it to a bad weed which may be prevalent on one farm or throughout a whole neighbourhood, and other districts may not be troubled with it at all, until it spreads to them from the infected areas in one or more of the many ways that everybody knows weeds spread. The germ, though small—it has to be magnified a thousand times before it can be seen—has a comparatively thick, gelatinous covering when it grows in milk; and as one germ dropped into milk will increase into myriads of its kind in twenty-four hours, we can easily see how the milk becomes stringy or ropy; it is simply because millions of these germs with their sticky, slimy coverings have developed in the milk, until the milk is practically nothing but a mass of them.

At the farms at which investigations were carried on, the cattle on inspection appeared to be all right, and samples of their milk tested were proven to be free from the trouble. Samples of water from the wells, cisterns, and cooling vats proved these to be the sources of the trouble in every instance. In one case, the barnyard well proved to be badly infected, and from this well the cooling vats were filled, and they were badly infected. Just one drop of this water accidentally splashed into a can of milk would cause it to become ropy. If this water splashed on to the floor and then dried up, the dust on the floor would be infected with the troublesome bacteria, and if this dust blew into the milk the milk would turn ropy. If any of this water got on the milkman's hands, he would be liable to smear it on the cans when he was putting them into the vat or when he was putting on the can lids, and the result would be ropy milk. In many other ways it would be possible for a little of this water to get into the milk. Then if the cans, pails, and strainers were not thoroughly scalded after they had once had infected milk in them, the milk that was put into them afterwards would become ropy. As it takes from twelve to thirty-six hours for the ropiness to develop, the milk has usually left the milkman's or farmer's hands before it gets ropy, and he knows nothing of it until he hears from his customers about it next day.

REMEDY FOR "ROPY" MILK. Such, then, is the nature of the trouble and its cause; now for the remedy. When once milk is infected, it cannot be prevented from becoming ropy unless it turns sour. The souring of the milk by the lactic acid germ will prevent the development of the ropy milk germ, and we have known farmers prefer to have their milk turn sour rather than have the reputation of being the retailers of ropy milk, and so they did not put their cans into the cooling vats. The remedy for the trouble then is to prevent the germs from getting into the milk, and to prevent them from getting in we must know how they get in and where they come from. A simple way of ascertaining where they come from is to take a series of vessels, such as tumblers, cups, bottles, or jugs, thoroughly scald these and put into them some milk immediately after milking. Then into one of these put about a spoonful of water from the cooling vat, into another the same quantity from the well or cistern, into another a little dust from the stable or milk house floor, and so on, putting into one of these vessels of milk a little of the water or other material which may be suspected of being the source of infection. Then cover these over with a plate or saucer, or anything else that has been scalded, and put them away where they will not be disturbed for twenty-four hours or so. Then using a different spoon or fork for each one, test them for ropiness, and in this way one can find out where the germ is coming from. All cans, pails, and strainers should be *thoroughly* scalded or steamed before use each time. If the source of contamination be a well or cistern, the water from these should not be allowed to touch the cans, pails, etc.

The walls of the stables and milk house should be thoroughly disinfected with whitewash made by mixing water with unslaked lime to make a wash the consistency of thin cream, to which mixture is added commercial sulphuric acid, concentrated, in the proportion of one gallon of the acid to twenty gallons of the lime wash. This mixture should be made up in small lots and applied hot, as it is only in this condition that it is effective as a disinfectant. The milk house floors may be covered with the same mixture and afterward scrubbed with scalding water and a good washing powder.

See that *each* utensil is thoroughly cleansed and scalded. When one kettle or pail of water is used for scalding half a dozen or more cans, the water is no longer scalding hot after it reaches the second can even, and as it is poured into each can from the one before, it gets cooler and cooler, and has no effect upon the bacteria that may be present. Where a separate milk house is maintained, means should be provided for plenty of boiling water, or steam at the milk house, for thorough scalding is the keynote of success in getting rid and keeping rid of milk troubles.

PLANT DISEASES. (By Mr. D. H. Jones.) With one exception, *i.e.*, blight of apple and pear tree, bacterial plant diseases have not been very prevalent in the Province this year. The dryness of the season was largely, if not altogether responsible for this. One or two cases of black rot or wilt of cabbage caused by *Pseudomonas campestris,* and several samples of field and garden beans suffering from bean bacteriosis caused by *Pseudomonas phaseoli* have been forwarded to the department for examination. No cucumber wilt or soft rot of cabbage, cauliflower, turnip, carrot or bacterial wilt and rot of potato were brought before our notice, and not a single case of any one of these diseases occurred on the College property.

The bacterial blight of apple and pear trees, however, has been very severe in most of the pome fruit districts. Many pear trees were killed and a large percentage of the young growth on apple trees was withered and destroyed by this disease. Special attention was given to this disease during the summer, and the result of the investigations made has been submitted as an illustrated bulletin.

PLANT LICE RESPONSIBLE. *It was found that fifty per cent. of the total amount of twig blight that occurred on apple trees, and that practically all cases of twig blight that occurred after the blossoming season was over, were due to in-*

oculation of the disease germs into twigs, suckers, and water sprouts by aphids, principally Aphis mali and Schizoneura lanigera.

It is well known to orchard men that the aphid's favorite feeding place is on the water sprouts, suckers, and young twigs of the trees. It is here they find the tender bark which they can easily puncture to obtain the plant juice which is so plentiful there. Now it is the tender, juicy bark that supplies the ideal condition for rapid development of the blight germ. An aphid, when feeding, punctures the bark from which it draws the sap with its sucking tubes. Should the twig which it punctures have the blight, the sucking tube which is inserted in the bark will be contaminated with the blight germs, and so, when the aphid moves to another twig, it will carry the germs on its sucking tube, which on puncturing the fresh twig will inoculate it with the germs of the disease. We found this to be happening in practically all the orchards we visited during June, July, and early August. We found many young trees that had not yet borne a blossom and that were absolutely free from blight before the aphids came in June, to have after this date all their young shoots killed out by the gradual spread of the disease from the tips downward after they had been inoculated by aphids. We also found large numbers of suckers and water sprouts on the older trees develop the disease after the aphids visited them, and rapidly die. In many cases when the disease reached the base of the watersprout or sucker it entered the limb or trunk on which the shoot grew and there formed a canker, sometimes large and spreading, if the bark was juicy, and sometimes small. The bark immediately surrounding such canker is liable to harbor the disease germs through the winter, then in the spring, when the sap begins to run once more, the germs rapidly develop, spread farther through the bark, thus enlarging the canker, and often girdling the limb, which results in its death.

We found aphids to be the principal means of spreading the blight in apple tree nurseries. Wherever in nurseries the aphids were kept in check there was practically no blight, while in the nurseries in which the aphid was allowed to have its way there the blight flourished in all directions.

While aphids and "twig blight" are both common on the apple, neither are very prevalent on the pear. Blight, however, kills off many more pear trees than apple trees. How, then, is the blight carried to the pear trees? It is sometimes carried to the blossoms by bees and wasps and it is such inoculations that are responsible for most cases of "twig blight" in the pear. "Body blight," however, is more common than "twig blight" in the pear. This is the same disease working in the bark of the trunk and larger limbs. How do the germs get into this old bark? Sometimes they enter it at the base of the twigs which have been inoculated at the blossoms. We found, however, this season cases of direct inoculation into the bark of healthy trees made by the fruit-bark-boring beetle (*Scolytus rugulosus*). This is the same beetle that works in the bark of the peach and cherry, causing them to exude large quantities of a gum-like material. The pear does not exude this gummy material, and as the hole made by the beetle is very small, and is usually underneath a bud or spur it is not readily seen. This beetle bores in the bark and is more common on weak or diseased trees than on healthy ones. We found the beetles in the bark of blighted trees to be literally covered with blight germs, and we found the disease to be developing around the fresh punctures made by these beetles in the bark of healthy trees. *The fruit-bark-boring beetle, then, is one means of spreading the blight among pear trees.*

The pruning-knife, saw, chisel, shears, harrows, cultivators, and other tools used in the orchard, after coming in contact with a diseased tree, are potent carriers of blight that could be clearly traced to this source of infection; and we proved in a number of experiments how easy it is for the disease to spread in this way. After using a knife and a saw on the diseased part of a tree and then on a healthy tree, niching the bark or cutting off branches, we found that in seventy-five per cent. of the experiments the healthy tree contracted the disease at the point cut.

Scraping healthy trees with diseased trees when removing the latter from the orchard is also a common method of inoculating healthy trees.

Eradication and Prevention of the Disease.

When once the disease enters a tree, whether it be in the fruit, twig, branch or trunk, there is no remedy for the affected part. The only measure to be adopted is to cut it out and burn it right away. To cut off an affected twig will save the branch on which it grows, and to cut off a diseased large branch will save the tree.

In cutting dead or diseased tissue from a tree, care must be taken to cut from six inches to a foot below the blighted area, as the germs always extend further than the visibly affected part.

The best time to cut out blight is the first time it is seen, as every case of active blight is a potent source of infection for innumerable other cases. However, it is not always practicable to locate every case of blight as it occurs. The best time for systematic action in an orchard is in late fall or early winter. At this time the diseased parts are more readily noticed than in late winter or early spring; and if precautions be taken to burn the material cut out, this will ensure the destruction of the beetles, aphids, and other insects harboring on and in it.

If an orchard be cleared of the blight during the winter, there will be no germs there for insects to get contaminated with in the following spring. Hence, as the bees and wasps go from flower to flower they will not infect the blossom. The blossoms not being inoculated, there will be no early twig blight; so that when the aphids come later in the season, there will be no source of infection for them. If, however, there should be affected trees in the neighbourhood of the orchard, which is usually the case, then the only way to keep the disease out of the orchard is to control the insects.

The aphids may be kept in check by spraying the trees when the buds are just beginning to swell, with home boiled lime-sulphur, preferably of the strength of 25 lbs. lime, 20 lbs. sulphur, to 40 gallons of water. This is to kill the eggs which may be seen on the twigs and smaller branches of the tree. To destroy the aphids in summer give them a thorough drenching with kerosene emulsion. In the fall observe if any aphids are present on the water sprouts, where they will be found, if there are any on the trees at all at this time of the year. If present, cut off the water sprouts and destroy them.

Several bad outbreaks of the fruit-bark-boring beetle in peach and cherry orchards have been traced to wood piles made from diseased and dead wood taken from the orchard. It is in such wood that the beetles winter over and in the spring they issue from it in large numbers and make their way usually to the orchard once more. This shows the necessity for burning dead and diseased wood taken from the orchard before spring.

We feel certain that if concerted action, such as indicated, be taken on the part of all fruit growers in any district, the disease may be wiped out of that district and be prevented from entering it any more.

TUBERCULOSIS. A number of cases of tuberculosis in different species of animals have come to our notice.

In my report for last year special notice was made of tuberculosis in fowls. During the year just passed, more data have been collected showing the wide distribution of this disease in Ontario, and cases in seventeen hens and one turkey were examined in the laboratory.

We were called upon to examine seven carcasses of cattle for tuberculosis. Six of these were slaughtered subsequent to the tuberculin test, and the disease was found present in each case.

Observations were made on one case of tuberculosis in a dog.

An interesting case of tuberculosis in horses also came to our notice. During September we received a piece of peritoneum which we later learned was from a horse, and stained preparations from which gave the characteristic reaction for the organism of tuberculosis. Arrangements were made with the owner to apply the tuberculin test to the remainder of his horses, with the result that three out of eight tested gave typical reactions for tuberculosis. Two cows in the same stable also reacted to the test at the same time. The particular interest attached to these cases lies in the fact that tuberculosis in horses is considered very rare. So far as we have been able to determine from the literature available, less than fifty cases have been reported. In our cases, complete isolation of the reacting from the healthy animals, thorough disinfection and a retest in six months was recommended.

One case of tuberculosis in a hog was observed.

Aside from the foregoing review of the year's laboratory work, there were many cases of less particular interest, numbering a total of 161 cases, or an increase of 43 over the corresponding period for 1907-1908.

During the year we distributed ninety-eight lactic acid starters to cheese and buttermakers.

LEGUME BACTERIA.

The distribution of cultures of nitrogen-accumulating bacteria for inoculating seeds of legumes was continued with the same good success that has attended the work of the department along this line in the years previous. Briefly, the results are as follows: A total of 2,017 cultures were sent to 1,227 farmers in the nine provinces of the Dominion and three foreign countries. 372 reports were received from farmers giving the results of their experiment, of which 56.7 per cent. stated that benefit had been derived from the use of the cultures.

We are preparing to send similar cultures during 1910. For the benefit of those desiring such cultures, I quote the following paragraph from my report for 1908:

"Cultures for inoculating seed will be sent during the coming season for seed of the following crops: Alfalfa, red clover, alsike clover, peas, beans, sweet peas, vetches. The laboratory prepares but one size package of culture, that being sufficient for 60 pounds of seed, and a nominal price of twenty-five cents is charged for each package to cover cost of preparation, postage, etc. Each kind of seed requires a different kind of culture. All applications should state the kind of seed on which the culture is to be used, the number of cultures desired, and as near as can be judged the date of seeding. Remittance may be in any convenient way and should be sent with application to S. F. Edwards, Ontario Agricultural College, Guelph, Canada."

A tabulated summary of the year's results follow:

CULTURES SENT, 1909.

	Alfalfa.	Red Clover.	Beans.	Alsike Clover.	Peas.	Sweet Peas.	Vetch.	No. of farmers receiving Cultures.
Ontario............	1,205	346	10	34	62	11	2	1,022
Quebec	31	4	0	1	1	5	0	35
Nova Scotia........	2	8	2	1	1	1	1	9
New Brunswick ...	62	4	0	3	1	0	0	17
P. E. Island	6	2	0	0	0	0	0	6
Manitoba	10	8	0	4	1	0	1	15
Saskatchewan	31	4	0	1	2	1	0	32
Alberta	27	4	2	3	6	0	0	31
British Columbia ..	29	33	3	4	6	3	4	51
United States......	6	3	0	0	0	2	0	7
Mexico	1	1	5	0	5	0	0	1
New Zealand	1	0	0	0	0	0	0	1
Totals.........	1,411	417	22	51	85	23	8	1,227

Total number of cultures sent out during the year, 2,017.

RESULTS OF INOCULATION, 1909.

	Alfala.		Red Clover.		Alsike Clover.		Peas.		Beans.		Sweet Peas.	
	+	—	+	—	+	—	+	—	+	—	+	—
Ontario	130	98	35	34	1	2	5	5	....	....	3	1
British Columbia ...	2	2	4	1	1	......	1	....	....	....	2	.....
Alberta	2	3	1	1	1	.....	....	....	....	....	......	......
Quebec	5	1	1	......	1	......	....	....	....	....	1	......
P. E. Island ..	3	....	......	......	....	......	....	....	....	....	......	......
Saskatchewan.	4	4	2	1	....	......	....	....	....	....	......	......
Manitoba	1	2	......	2	....	2	....	....	....	....	......	......
New Brunswick .	1	2	2	......	2	......	....	....	....	....	......	......
Total.... ..	148	112	45	39	6	4	6	5	....	....	6	1
	56.9%		53.5%		60%		54.5%				85.1%	

+ Indicates benefit from the inoculation.
— Indicates no benefit from the inoculation.

In conclusion, I wish to acknowledge my indebtedness to the other members of the departmental staff for their earnest co-operation in all the work of the department, and to Miss Ruth Edwards, who assumed practical charge of the sending of the cultures for inoculating seed for three months during the spring.

Respectfully submitted,

S. F. EDWARDS.

PART XI.

THE PROFESSOR OF ANIMAL HUSBANDRY AND FARM SUPERINTENDENT.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith the report of my department for 1909.

As in past years, my work divides itself roughly into four departments, viz., lectures in the College; direction of live stock experiments; superintendence of the farm; and outside work, comprising attendance at Farmers' Institutes, Short Courses, and many other lines of work with which my position at the College brings me into contact.

The lecture work in the College calls for no comment here, and the live stock experiments completed during the year will be found in another part of my report. I may say, however, that we have some very important work started regarding which I shall have nothing to say until a later date.

Since the appointment of a number of our graduates to positions in High Schools throughout the Province, there has been an active demand for the services of both Mr. Wade and myself to assist with short courses inaugurated by these young men in their districts. This line of work has grown to such an extent that it has become a more or less serious problem, and it is difficult to know just what will be the outcome. It is only natural that the services of some person from this institution should be desired by the people where these short courses are held, and their requests for help are insistent and hard to refuse. The result is that a very serious inroad is made upon our work at the College, and our own students miss quite a number of lectures in consequence. We have aimed to assist the agricultural representatives as far as lay in our power, for the reason that we think their work is important and should receive all the support we can possibly give it. It is nearing a time, however, when some arrangement will have to be made to prevent such serious interference with lectures in the College as has occurred in the past, and the problem is of sufficient importance to call for very serious consideration.

In connection with the Farm department, I would like to call attention to two very important needs of this department. The first of these is a horse stable suitable for accommodating at least a limited number of breeding stock. During the past few years we have tried to do a very little in the way of horse breeding, but we have reached the limit of our accommodation, and if this very important branch of Animal Husbandry is to be recognized at this institution, some sort of additional accommodation for horses will be absolutely necessary. I trust that the very reasonable demands of the horse breeders throughout the Province may receive recognition at this institution, which is supposed to work in the interests of all classes of stock breeders.

Another important requirement in connection with our animal husbandry work is a new dairy stable. The present dairy stable is merely a patched-up affair, which was made out of an old, tumble-down building nearly twenty years ago. It is entirely inadequate for our requirements and is unsanitary, there not being enough space to admit of proper ventilation. An up-to-date dairy stable would be a great boon to the interests of dairying at this institution, and it would also be of much service as a model to dairy farmers who visit the College. It is not to the credit of the institution that its dairy herd should be kept in unsanitary surroundings.

There are other things required in connection with the proper handling of our live stock, but the two just mentioned seem absolutely imperative if our work is to be at all effective, and I trust the matter may receive favorable consideration from the Department of Agriculture.

THE DAIRY HERD.

Following is the record of the herd for the past year:

Report of Dairy Herd from December 1st, 1908, to November 30th, 1909.

Name.	Breed.	Age, Dec. 1, 1908.	Number of days milking.	Lbs. milk.	Average per cent. of fat in milk.	Lbs. of fat in milk.	Lbs. butter adding ⅙ to fat.	Value of fat at 25c. per lb.	Cost of feed.	Profit over cost of feed.
								$ c.	$ c.	$ c.
Boutsje	H	6	288	12,939	3.55	459.41	535.98	114 85	64 09	50 76
Lady Springwood 2nd	H	5	322	12,190	3.55	432.34	504.39	108 08	49 08	59 00
Marjorie Cornelius	H	5	322	11,936	3.2	382.24	445.95	95 56	48 22	47 32
Minnie of Elm Shade	A	4	296	9,469	3.77	357.60	417.20	89 40	45 24	44 16
Toitilla	H	7	276	9,309	3.6	337.17	393.36	84 29	47 81	36 48
Denty 10th	A	10	324	6,898	4.85	334.63	390.40	83 66	45 20	38 46
Abby Mercena Netherland	H	3	337	9,887	3.4	334.40	390.13	83 59	45 46	38 13
Bugle's Buttercup	J	11	317	6,484	5.0	326.05	380 39	81 51	33 67	47 84
Lady Nancie 2nd	A	8	315	8,153	3.93	320.44	373.85	80 11	43 94	36 17
Tibby Fizzaway	A	3	326	7,204	4.38	315.72	368.34	78 93	42 04	36 89
Molly Netherland	H	4	283	8,879	3.5	312.33	361.38	78 08	52 78	25 30
White Rose	A	5	293	6,973	4.43	308.83	260.30	77 21	42 54	34 67
Molly De Kol	H	7	355	7,803	3.9	307.26	358.47	76 81	44 59	32 22
Dewdrop's Aggie	J	7	365	5,536	5.37	297.23	346.77	74 31	36 31	38 00
Mercena Netherland	H	4	299	9,412	3.15	296.54	345.96	74 13	47 02	27 11
May Queen	A	7	285	8,091	3.63	293.90	342.88	73 47	36 01	37 46
King Joseph's Dream	J	4	336	5,609	5.0	280.31	327.06	70 08	38 85	31 23
Beauty O.A.C.	H	4	274	8,768	3.0	265.93	310.25	66 48	41 62	24 86
Buttercup's Queenie	J	10	304	5,036	5.1	257.32	300.20	64 33	32 43	31 90
Dolly	J	6	305	5,743	4.38	251.71	293.66	62 93	40 82	22 11
Inka Mercedes	H	9	294	7,388	3.3	246.14	287.16	61 53	38 01	23 52
Margaret Cornucopia	H	3	319	5,634	3.6	202.21	235.91	50 55	36 57	13 98
Average of 11 cows	H	5	306	9,468	3.43	325.09	379.27	81 27	46 84	34 43
" 5 "	J	8	325	5,681	4.97	282.53	329.62	70 63	36 41	34 22
" 6 "	A	6	306	7,798	4.12	321.85	375.49	80 46	42 49	37 97

Notes on Herd Record.

(1) In the column denoting breed, "H" stands for Holstein, "J" for Jersey, and "A" for Ayrshire.

(2) The cows are ranked in order of production of butter fat.

(3) The food consumed by each cow is merely a close approximation, as we have not yet found it practicable to keep an exact record of food consumed by each animal. The estimate, however, is reasonably close and the amount of feed is checked by occasional weighings.

(4) The foods have been valued as follows: Meal (including bran), $20 per ton; Oil cake, $32 per ton; Hay, $8 per ton; Roots, $2 per ton, and silage, $2 per ton. Pasture is valued at $1.00 per cow per month. These values are somewhat below present market prices, but we have aimed to take fairly average market values which might be used from year to year for purposes of comparison.

(5) At the foot of the table it will be noted that the averages made by each breed are given. The Holsteins lead in total production, but their cost of feed is somewhat higher than that of the other two breeds. In profit over cost of feed, the Ayrshires lead, and the Holsteins and Jerseys come very close. In fact, when we consider that the method of computing foods is merely an approximation, we may say that the three breeds have given practically equal results.

Experiments with Dairy Cattle.

Our experiments this year consist of comparisons of several concentrates. The bulky part of the ration was the same throughout all the experiments and consisted of mangels, corn silage, and mixed clover and timothy hay. An effort was made to keep this part of the ration as uniform as possible throughout the duration of the experiment.

Three cows were used in each experiment, and the experiment divided into three periods of two weeks each. During the first and third periods the cows were fed identically the same ration. During the second period a different ration was fed, and the results of the second period compared with the average of the first and third periods This arrangement allows for the natural decrease in milk flow as the period of lactation advances.

The milk and butter fat produced during the first week of each period has not been taken into consideration, only the second week of each period being considered. This plan was adopted to allow the cows to become accustomed to the change in feed, and it also tends to prevent the effects from the use of one kind of food being carried over into the next period.

Possibly no plan which can be devised is entirely satisfactory, and there are possibilities for error under any system. We have done our best to make the conditions the same throughout each experiment, but, no doubt, in spite of all our efforts, there would be variations in the character of the bulky fodders which might have an influence upon the results. Our results, therefore, must be regarded as approximations, and they are suggestive rather than absolutely conclusive. This, however, is true of all experiments with dairy cows, and is a condition of affairs which cannot be avoided. We think, however, that the work is not without its value, and if viewed in the proper light, should be helpful as a means of comparing some of the foods under consideration.

Oats *vs.* Oats and Barley.

Barley is not generally regarded with favor by dairymen, while oats have a good reputation as milk producers. Owing to the fact that oats have been so very dear during the past year or two, and that barley has cost considerably less per ton, we thought that it would be of interest to study the effect of adding a certain amount of barley to a meal ration of oats. Two experiments were conducted along this line. In the first experiment oats were fed for two weeks, then a mixture of two parts oats and one part of barley for two weeks, followed by a two weeks' period of oat feeding. The following table shows milk and butter fat produced, and concentrates consumed by three cows:

——	Period I. One week Oats.	Period III. One week. Oats.	Average of Periods I. and III. Oats.	Period II. One week. Oats and Barley.
Total milk produced by three cows.	614 lbs.	570 lbs.	592 lbs.	590 lbs.
Average milk per cow per day ...	29.24 lbs.	27.14 lbs.	28.19 lbs.	28.09 lbs.
Average per cent. of fat	3.92%	4.13%	4.02%	3.94%
Total fat produced by three cows.	24.055 lbs.	23.53 lbs.	23.792 lbs.	23.257 lbs.
Average fat per cow per day.....	1.145 lb.	1.12 lb.	1.133 lb.	1.107 lb.
Concentrates consumed by three cows	189 lbs.	189 lbs.	189 lbs.	189 lbs.
Oats, or oats and barley consumed per 100 lbs. fat produced.	....	....	794.38 lbs.	812 65 lbs.
Relative value of oats, and oats and barley for producing butter fat......	....	....	102.29	100
Oats, or oats and barley consumed per 100 lbs. milk produced	....	....	31.92 lbs.	32.03 lbs.
Relative value of oats and oats and barley for producing milk.	....	....	100.34	100

Before commenting on this table, we will submit another one where a larger proportion of barley was added to the oat ration. In the first period, oats alone were fed; in the second, equal parts of barley and oats, and in the third, oats alone, and the table given below shows results:

——	Period I. One week. Oats.	Period III. One week. Oats.	Average of Periods I. and III. Oats.	Period II. One week. Oats and Barley.
Total milk produced by three cows.	570 lbs.	513 lbs.	541.5 lbs.	548 lbs.
Average milk per cow per day...	27.14 lbs.	24.43 lbs.	25.79 lbs.	26.09 lbs.
Average per cent. fat............	4.13%	3.88%	4.01%	4.07%
Total fat produced by three cows.	23.53 lbs.	19.936 lbs.	21.733 lbs.	22.332 lbs.
Average fat per cow per pay.....	1.12 lb.	.949 lb.	1.035 lb.	1.063 lb.
Concentrates consumed by three cows........................	189 lbs.	189 lbs.	189 lbs.	189 lbs.
Oats, or oats and barley consumed per 100 lbs. fat produced.	....	....	869.64 lbs.	846.32 lbs.
Relative value of oats, and oats and barley for producing butter fat..........................	....	....	100	120.71
Oats, or oats and barley consumed per 100 lbs. milk produced......	....	....	34.903 lbs.	34.854 lbs.
Relative value of oats, and oats and barley for producing milk..	....	....	100	101.2

Comments.

Though barley is not, as a rule, a particularly palatable food, still the cows on the whole seemed to relish the mixture of oats and barley rather better than the ration of clear oats.

The last two columns of each table really show the comparisons. The first two columns merely give a comparison of the first and third periods, which may be of interest to some who wish to study the experiments in detail.

In the first experiment, it will be noted that the cows gave practically the same amounts of milk, yielding practically equal amounts of butter fat on the two rations. There is, it is true, a slight difference, but so slight that even a greater difference might occur had the same ration been fed throughout.

In this experiment, therefore, the addition of one part of barley to two parts of oats did not apparently decrease the efficiency of the ration.

In the second table it will be noted that the cows gave somewhat more milk and yielded more butter fat upon the mixture of oats and barley than upon oats alone.

A peculiar feature is the fact that the increase in fat upon oats and barley as compared with oats is relatively greater than the increase in milk. As milk producers, the two rations may be said to be practically equal, there being a very slight advantage in favour of the mixture of oats and barley.

Owing to the fact that the fat in milk will vary when conditions are made as nearly the same as possible, and is subject to wider variations than the yield of milk, we regard the comparison of the rations on the basis of milk production as more satisfactory than the comparison on the basis of fat production. In this second experiment, therefore, the indications are that the mixture of equal parts of oats and barley proved equal to the ration of oats alone, the difference being so slight that it might be disregarded.

OATS VS. BRAN.

Oats and bran are both well known dairy foods, and yet there seems to be a great scarcity of information regarding their relative value for milk production. For this reason we ran through a single experiment to compare these two foods. It will be borne in mind that each period consisted of two weeks, though only one week of each period is reported. On the whole, the cows ate the ration consisting of bran rather better than the oats, though there was very little difference in this respect. The following table shows milk and butter fat produced and concentrates consumed by three cows:

——	Period I., One week Bran.	Period III., One week Bran.	Average of Periods I. and III. Bran.	Period II., One week, Oats.
Total milk produced by 3 cows...	569 lbs.	485 lbs.	527 lbs.	552 lbs.
Average milk per cow per day....	27.09 lbs.	23.09 lbs.	25.09 lbs.	26.28 lbs.
Average per cent fat............	3.18%	3.46%	3.32%	3.31%
Total fat produced by 3 cows.....	18.153 lbs.	16 819 lbs.	17.486 lbs.	18.304 lbs.
Average fat per cow per day.....	.864 lb.	.800 lb.	.832 lb.	.871 lb.
Concentrates consumed by 3 cows.	189 lbs.	189 lbs.	189 lbs.	189 lbs.
Oats or bran consumed per 100 lbs. fat produced...............	....	....	1080.86 lbs.	1032.56 lbs.
Relative value of oats and bran for producing butter fat........	....	....	100	104.6
Oats or bran consumed per 100 lbs. milk produced.............	....	....	35.86 lbs.	34.24 lbs.
Relative value of oats and bran for producing milk............	....	....	100	104.7

Comments.

It will be noted by comparing the first period with the third, that the milk flow was fairly well maintained, indicating that both oats and bran are fairly satisfactory rations. It will be noted, also, that if we place the value of bran as shown by this experiment at one hundred, oats show a value of 104.6 for butter fat production, and 104.7 for milk production. In this experiment, therefore, the relative value of oats as compared with bran remains practically constant in both fat and milk production.

There is a slight advantage in favour of oats, namely, a little less than five per cent. At present prices, therefore, bran would be a very much more economical ration for cows than oats.

BRAN VS. BRAN AND OIL MEAL.

Though a liberal ration of bran seems to maintain the flow of milk fairly well, we have found in our everyday experience that the addition of oil meal will often help to improve the milk flow, especially if there is considerable timothy in the hay ration.

In this experiment, the cows were fed nine pounds of bran each per day for two weeks, then for two weeks they were fed seven pounds of bran and two pounds of oil meal, followed by a two week period of bran, fed as before. As in previous experiments, only the second week of each period is considered. The table which follows shows milk and butter fat produced, and concentrates consumed by three cows:

—	Period I. One week. Bran.	Period III. One week. Bran.	Average of Periods I. and III. Bran.	Period II. One week. Bran and Oil Cake.
Total milk produced by 3 cows ..	485 lbs.	443 lbs.	464 lbs.	500 lbs.
Average milk per cow per day....	23.09 lbs.	21.09 lbs.	22.09 lbs.	23.81 lbs.
Average per cent. of fat.........	3.47%	3.28%	3.38%	3.336%
Total fat produced by 3 cows	16.819 lbs.	14.549 lbs.	15.684 lbs.	16.68 lbs.
Average fat per cow per day......	.8 lb.	.693 lb.	.747 lb.	.794 lb.
Concentrates consumed by 3 cows.	189 lbs.	189 lbs.	189 lbs.	189 lbs.
Bran, or bran and oil meal consumed per 100 lbs. fat produced.	....	....	1205.05 lbs.	1133.09 lbs.
Relative value of bran, and bran and oil meal for producing butter fat.....	....	....	100	106.3
Bran, or bran and oil meal consumed per 100 lbs. milk produced	....	....	40.73 lbs.	37.8 lbs.
Relative value of bran, and bran and oil meal for producing milk.	....	.. ..	100	107.7

Comments.

It will be noted that the substitution of two pounds of oil cake for two pounds of bran in the ration increased the flow of milk to a certain extent.

On the basis of milk production, the ration of bran and oil meal proved nearly eight per cent. higher in value than the ration of bran alone. (See bottom line of table.)

Owing to the higher cost per ton of oil meal, the increase in milk flow scarcely paid for the increase in the cost of the ration due to the addition of oil meal.

The statement in the preceding paragraph does not take into consideration the importance of maintaining the milk flow and its possible effect upon the milk yield for a whole period of lactation, and it is quite probable that the use of oil meal would be profitable in the long run under many conditions.

It is quite probable that in another experiment a considerably larger increase in production might be obtained through the use of oil meal.

Bran vs. Molac Dairy Food.

In last year's report will be found a comparison of a mixture of oats and bran with a mixture of oats and Molac. This year, however, we took the two foods separately, feeding an exclusive meal ration of bran for two weeks, followed by two weeks on Molac, with a return to bran for a final period of two weeks. Nine pounds per cow per day of each kind of concentrate were fed. Following is the table showing milk and butter fat produced, and concentrates consumed by three cows:

—	Period I. One week. Bran.	Period III. One week. Bran.	Average of Periods I. and III. Bran.	Period II. One week. Molac.
Total milk produced by 3 cows...	552 lbs.	570 lbs.	561 lbs.	634 lbs.
Average milk per cow per day....	26.29 lbs.	27.14 lbs.	26.71 lbs.	30.19 lbs.
Average per cent. of fat.........	3.66%	3.69%	3.68%	3.51%
Total fat produced by 3 cows	20.23 lbs.	21.036 lbs.	20.633 lbs.	22.261 lbs.
Average fat per cow per day.....	.963 lb.	1.001 lb.	.982 lb.	1.06 lb.
Concentrates consumed by 3 cows.	189 lbs.	189 lbs.	189 lbs.	189 lbs
Bran or Molac consumed per 100 lbs. milk produced................................			916 lbs.	849.02 lbs.
Relative value of bran and Molac for producing butter fat..............................			100	107.89
Bran or Molac consumed per 100 lbs. milk produced................................			33.69 lbs.	29.8 lbs.
Relative value of bran and Molac for producing milk....................................			100	113.05

Comments.

Molac dairy food is especially palatable and is greatly relished by cows.

In general it may be said that its composition is very similar to that of bran, and its main claim to favor is its palatability.

It will be noted that the cows yielded considerably more milk on Molac than on bran, though the per cent. of fat was lower with the larger milk yield, making the total fat yield scarcely in proportion to the milk yield.

As previously stated, we prefer to compare the foods on the basis of milk yield, and upon this basis Molac proved thirteen per cent. higher in feeding value than bran (see last line of table). This is scarcely so good a showing as was made by Molac last year, and it is impossible to say whether the difference was due to individual differences in the cows, or whether the Molac differed in composition from that used last year. A food made up such as this food is may vary more or less in composition, which is one of the greatest objections to a food of this kind.

BRAN VS. SUGAR BEET MEAL.

Sugar beet meal consists of the dried beet pulp after the sugar has been extracted. The pulp is ground and will keep practically as well as bran. The cost of this product will no doubt vary in different districts, but, as a rule, it can be obtained at a lower price than bran.

We aimed to feed nine pounds per cow per day of the concentrated food, and the division of the time of the experiment was the same as in previous experiments. Following is a table showing milk and butter fat produced, and concentrates consumed by three cows:

——	Period I. One week. Bran.	Period III. One week. Bran.	Average of periods 1 and III. Bran.	Period II. One week. Sugar Beet Meal.
Total milk produced by three cows	659 lbs.	552 lbs.	605.5 lbs.	556 lbs.
Average milk per cow per day ...	31.38 lbs.	26.29 lbs.	28.83 lbs.	26.48 lbs.
Average per cent. fat	3.5%	3.66%	3.57%	3.35%
Total fat produced by three cows.	23.064 lbs.	20.23 lbs.	21.647 lbs.	18.619 lbs.
Average fat per cow per day.....	1.098 lbs.	.963 lbs.	1.031 lbs	.886 lbs.
Concentrates consumed by three cows	189 lbs.	189 lbs.	189 lbs.	189 lbs.
Bran or S. B. meal consumed per 100 lbs. fat produced	....	....	873.1 lbs.	1015.09 lbs.
Relative value of bran or S. B. meal for producing butter fat..	....	....	116.26	100
Bran or S. B. meal consumed per 100 lbs. milk produced.........	....	....	31.21 lbs.	33.99 lbs
Relative value of bran and S. B. meal for producing milk.......	....	....	108.9	100

Comments.

The great difficulty with the sugar beet meal is its lack of palatability. Some of the cows ate it fairly well, but all of them preferred bran. One cow, however, decidedly objected to eating the sugar beet meal and it was with the greatest difficulty that we induced her to eat it. This was an unsatisfactory feature of the experiment, and no doubt interfered with the results. At the same time, we do not consider it unfair to give comparisons of results, because palatability is a very important feature of a ration, and if the milk yield is decreased as a result of lack of palatability, the food which possesses this objectionable feature should be charged with the decrease. It is possible, however, that for an extended period of feeding, sugar beet meal might show up to better advantage, because the chances are that the cows would become accustomed to it in time and would probably eat it more satisfactorily.

In spite of the drawback of unpalatability, sugar beet meal measures up fairly well with bran on the basis of milk production, bran showing about nine per cent. higher feeding value in this experiment. For the production of butter fat, bran shows to better advantage, though, as stated before, we regard the milk as a safer guide.

Sugar beet meal, if it can be procured at a considerably lower price than bran, is well worth consideration, and the chances are that most cows could be taught to eat it satisfactorily in the course of time.

MOLAC DAIRY FOOD VS. TILLSON'S DAIRY FOOD.

These are two foods of very similar composition, but Molac is somewhat the more palatable of the two. These two foods were each fed combined with an equal quantity of bran, the total meal ration per day being ten pounds, and the time was divided into three periods as in the other experiments. The following table shows the milk and butter fat produced, and concentrates consumed by three cows:

——	Period I. One week. Tillson's and Bran.	Period III. One week. Tillson's and Bran.	Average of periods I and III. Tillson's and Bran.	Period II. One week. Molac and Bran.
Total milk produced by three cows	574 lbs.	558 lbs.	566 lbs.	566 lbs.
Average milk per cow per day ...	27.33 lbs.	26.57 lbs.	26.95 lbs.	26.95 lbs.
Average per cent. fat	3.59%	3.64%	3.61%	3.64%
Total fat produced by three cows.	20.591 lbs.	20.331 lbs.	20.461 lbs.	20.62 lbs.
Average fat per cow per day.....	.979 lbs.	.968 lbs.	.974 lbs.	.982 lbs.
Concentrates consumed by three cows	Bran 105 lbs. Tils. 105 lbs.	Bran 105 lbs. Tils. 105 lbs.	Bran 105 lbs. Tils. 105 lbs.	Bran 105 lbs. Molac 105 lbs.
Tillson's or Molac consumed per 100 lbs. butter fat produced....	....	....	513.12 lbs.	509.21 lbs.
Relative value of Tillson's and Molac for producing butter fat.	....	....	100	100.76
Tillson's or Molac consumed per 100 lbs. milk produced.........	....	....	18.55 lbs.	18.55 lbs.
Relative value of Tillson's and Molac for producing milk......	....	....	100	100

Comment.

The table calls for very little comment, for the reason that in this experiment the two foods proved identical in value.

EXPERIMENTS WITH SWINE.

During the past summer we did considerable work in comparing various dairy by-products. The first of these experiments deals with pasteurized whey and ordinary whey.

It will be noted that three separate tests were made. In the first two tests, only about two and one-half pounds of whey were used with each pound of meal, but in the third test, between five and six pounds of whey were used for every pound of meal.

The groups receiving water and meal were used as check groups and enable a person to determine the amount of meal saved by a given quantity of whey.

The following table gives details of the experiments:

TABLE SHOWING WEIGHTS, GAINS, AND FOOD CONSUMED IN THREE TESTS WITH PASTEURIZED AND ORDINARY WHEY.

——	Group I. Water and Meal.			Group II. Pasteurized Whey and Meal.			Group III. Ordinary Whey and Meal.		
	1st Test. 8 pigs.	2nd Test. 4 pigs.	3rd Test. 4 pigs.	1st Test. 8 pigs.	2nd Test. 4 pigs.	3rd Test. 4 pigs.	1st Test. 8 pigs.*	2nd Test. 3 pigs.	3rd Test. 4 pigs.
Days of experiment ...	104	90	90	104	90	90	104	90	90
Weight of pigs at commencement of experiment	lbs. 422	lbs. 269	lbs. 283	lbs. 361	lbs. 253	lbs. 280	lbs. 297	lbs. 215	lbs. 281
Weight of pigs at close of experiment.......	1,178	705	648	1,310	797	779	1,256	653	795
Total gain in weight ..	756	436	365	949	544	499	959	438	514
Average daily gain per pig................	.909	1.21	1.01	1.14	1.51	1.38	1.23	1.62	1.43
Total food consumed:									
Meal	2,956	1,564	1,412	2,849	1,547	1,344	2,795	1,298	1,363
Whey	....	....	....	7,570	3,335	7,365	7,270	2,653	7,365
Food consumed per 100 pounds increase in weight:									
Meal	391	358.7	386.8	300.2	284.4	269.3	291.4	296.3	265.2
Whey	....	....	....	797.7	613.0	1,475.9	758.1	605.7	1,432.9

* In the first test, Group III. started with eight pigs, but finished with seven pigs. Due allowance has been made in the calculation.

In order to simplify results, another short table is given which summarizes the material contained in the first table and simplifies the comparisons. It shows the amount of meal saved by one hundred pounds of pasteurized whey and one hundred pounds of ordinary whey in each test, and also the average of three tests.

SUMMARY AND AVERAGES OF TESTS WITH PASTEURIZED AND ORDINARY WHEY.

——	1st Test.	2nd Test.	3rd Test.	Average of three Tests.
100 lbs. pasteurized whey proved equal to.....	11.38 lbs. meal	12.12 lbs. meal	7.96 lbs. meal	10.12 lbs. meal
100 lbs. ordinary whey proved equal to.......................	13.13 lbs. meal	10.29 lbs. meal	8.49 lbs. meal	10.55 lbs. meal

Notes on Results.

(1) In two of the three tests, ordinary whey proved superior to pasteurized whey, and in one test, pasteurized whey gave better results than ordinary whey.

(2) The average of three tests shows the two kinds of whey to be very close in feeding value, though on an average, ordinary whey shows about four per cent. higher feeding value than pasteurized whey.

(3) It is interesting to note the amount of meal saved by one hundred pounds of whey in the third test as compared with the first and second tests. As stated before, a much larger proportion of whey in proportion to meal was used in the third test than in the other two, and the effect has been to distinctly lessen the amount of meal saved by one hundred pounds of whey. The result is quite in harmony with the results of other experiments of this nature. Whenever dairy by-products, such as skim-milk, butter-milk, or whey, are used in very large quantity, the amount of meal saved by one hundred pounds of dairy by-product is less than when the dairy by-product is used in smaller quantity in proportion to the meal.

(4) In general, it may be said that these three tests go to show that there is very little difference in value between pasteurized and ordinary whey, the difference, if any, being in favor of ordinary whey.

SEPARATED WHEY *vs.* ORDINARY WHEY.

This experiment is a continuation of last year's work and two experiments were conducted during the past summer. Great care was exercised in the selection of the pigs used in each experiment, and in each case rather better pigs were put in the check groups on water and meal than in the whey groups. This plan was followed in order that we might feel absolutely certain that our results were not too favorable to whey.

The following table shows details of the experiment.

TABLE SHOWING WEIGHTS, GAINS, AND FOOD CONSUMED ON SEPARATED WHEY AND ORDINARY WHEY.

	Group I. Water and meal.		Group II. Separated whey and meal.		Group III. Ordinary whey and meal.	
	1st Test 8 pigs.	2nd Test. 4 pigs.	1st Test. *8 pigs.	2nd Test. 4 pigs.	1st Test. 8 pigs.*	2nd Test. 3 pigs.
Days of experiment	104	90	104	90	104	90
Weight of pigs at commencement of experiment	422 lbs.	269 lbs.	302 lbs.	261 lbs.	297 lbs.	215 lbs.
Weight of pigs at close of experiment	1,178 lbs.	705 lbs.	1,195 lbs.	763 lbs.	1,256 lbs.	653 lbs.
Total gain in weight	756 lbs.	436 lbs.	893 lbs.	502 lbs.	959 lbs.	438 lbs.
Average daily gain per pig.	.909 lb.	1.21 lb.	1.12 lbs	1.39 lbs.	1.23 lbs	1.62 lbs.
Total food consumed:						
Meal	2,956 lbs.	1,564 lbs.	2,807 lbs.	1,516 lbs.	2,795 lbs.	1,298 lbs.
Whey			7,270 lbs.	3,335 lbs.	7,270 lbs.	2,653 lbs.
Food consumed per 100 lbs. increase in weight:						
Meal	391 lbs.	358.71 lb.	314.33 lbs.	301.99 lbs.	291.45 lbs.	296.35 lbs.
Whey			814.11 lbs.	664.34 lbs	758.08 lbs.	605.71 lbs.

* Groups II. and III. in the first test each started with 8 pigs, but one pig was discarded from each group before the close of the experiment, due allowance being made in computing results.

From the table just given, we have made the following summary which gives a very clear comparison of the two kinds of whey.

SUMMARY OF RESULTS WITH SEPARATED AND ORDINARY WHEY.

——	1st Test.	2nd Test.	Average of two Tests.
100 lbs. ordinary whey proved equal to...	13.13 lbs. meal	10.29 lbs. meal	12.13 lbs. meal.
100 lbs. separated whey proved equal to..	9.41 lbs. meal	8.54 lbs. meal	9.12 lbs. meal.

Comments.

(1) In each experiment one hundred pounds of ordinary whey proved equal to a larger amount of meal than one hundred pounds of separated whey.

(2) Taking the average of the two experiments, we find that if we represent the value of separated whey by 100, the value of ordinary whey would be represented by 133. In other words, ordinary whey proved 33 per cent. higher in feeding value than separated whey.

(3) In last year's experiment with the same products, we found ordinary whey to be twenty-five per cent. higher in feeding value than separated whey, so that it will be seen that this year the difference between the two kinds of whey is more marked than last year. It is probably quite safe to say that ordinary whey is worth from twenty-five to thirty per cent. more than separated whey.

WHEY, SKIM-MILK AND BUTTER-MILK.

This experiment is also a continuation of work started last year, but, owing to circumstances, we were able to run only one test with a small number of pigs in each group. This is an unsatisfactory feature of the experiment, but the pigs were carefully selected. As in the other experiments, the group receiving water and meal served as a check group and enabled us to make a comparison.

Following is a table showing details of the experiment:

TABLE SHOWING WEIGHTS, GAINS AND FOODS CONSUMED.

——	Group I. 4 pigs. Water and meal.	Group II. 3 pigs. Ordinary whey and meal	Group III. 4 pigs. Skim-milk and meal.	Group IV. 4 pigs. Butter-milk and meal.
Duration of experiment.........	90 days.	90 days.	90 days.	90 days.
Weight of pigs at commencement of experiment..............	269 lbs.	215 lbs.	249 lbs.	235 lbs.
Weight of pigs at close of experiment	705 lbs.	653 lbs.	796 lbs.	823 lbs.
Total gain in weight............	436 lbs.	438 lbs	547 lbs.	588 lbs.
Average daily gain per pig......	1 21 lbs.	1.62 lbs.	1.52 lbs.	1.63 lbs.
Total food consumed............	Meal. 1,564 lbs.	Meal, 1,298 lbs. Whey, 2,653 lbs.	Meal, 1 519 lbs. Skim-milk, 3,335 lbs	Meal. 1,516 lbs. Butter-milk, 3,335 lbs.
Food consumed per 100 lbs. increase in weight	Meal, 358.71 lbs.	Meal, 296.35 lbs. Whey, 605.71 lbs.	Meal, 277.7 lbs. Skim-milk, 610.05 lbs.	Meal, 257.82 lbs. Butter-milk, 567.19 lbs.

Following is a short summary of the results showing relative values of whey, skim-milk, and buttermilk in the matter of saving meal:

100 lbs. whey proved equal to	10.29 lbs. meal.
100 lbs. skim-milk proved equal to	13.28 lbs. meal.
100 lbs. buttermilk proved equal to	17.78 lbs. meal.

Comments.

(1) The most remarkable feature of this experiment is the marked superiority of buttermilk over skim-milk. If we represent the feeding value of whey as 100, skim-milk would be represented by 129.05, and buttermilk by 172.78. In this experiment, therefore, buttermilk proved nearly thirty-four per cent. higher in feeding value than skim-milk.

(2) In looking for the reason for this marked difference between buttermilk and skim-milk, we find that the buttermilk used in this experiment would average about .4 per cent. butter fat; whereas, the skim-milk, which was separator milk, ran only about .05 per cent. of fat, that is to say, the skim-milk contained only about one-eighth as much fat as the buttermilk. In hot weather the butter fat in buttermilk is apt to run somewhat high, and our 1909 experiments commenced in June and ended in August, so that it was conducted during the hottest part of the summer. No doubt much of the difference between these two products shown in this experiment can be accounted for on the basis of difference in fat content.

(3) Generally speaking, buttermilk and skim-milk are practically equal in feeding value, but buttermilk is a more variable product than skim-milk. In some cases, it may be worth considerably more, as in the case which has just come under our notice, and in other cases, where more water is incorporated with the buttermilk, it may be worth less than skim-milk. This tendency to vary in feeding value tends to detract from the market value of buttermilk. Skim-milk is much more uniform in composition and feeding value.

Respectfully submitted,

G. E. DAY.

PART XII.

THE LECTURER IN HORTICULTURE.

To the President of the Ontario Agricultural College:

Sir,—Academic work in Fruit and Vegetable Growing has been subject to no important change since last year. Classes have been increasing in size of late years rather faster than have facilities and equipment for their accommodation, so that more class room and laboratory space is urgently needed.

The two weeks' Special Short Course in Fruit Growing, held last winter, was successful in every way. The attendance was very encouraging but still larger numbers are hoped for next year. The attention of beginners and especially of young men is directed to this course. Prof. John Craig, College of Agriculture, Cornell University; Messrs. A. McNeill, R. Thompson, W. T. Macoun, D. Johnson, H. Jones, P. J. Carey, J. E. Johnson and others rendered valuable assistance and we desire hereby to thank them for their generous aid.

Addresses on fruit subjects were delivered at the following points in connection with special Fruit Institute meetings: Forest, Simcoe, Delhi, Waterford, Oshawa, Port Perry, and Cobourg.

Experimental work with fruit in the College plantations has not progressed this season. The unfavorable site occupied by the cherries, plums, pears, and raspberries has operated seriously against success, and the tree fruits mentioned have, as a matter of fact, been almost entirely destroyed by their unfavourable environment. We are quite convinced, after having studied the subject very carefully, that a much larger quantity of apples and other fruits could be produced in this locality than is now done. In former years considerable quantities of apples were shipped from Guelph and nearby stations, but of recent years the production has declined almost entirely. The reason is simply because tender varieties composed to a large extent the original plantings, and these have been recently weeded out by one or two unusually severe winters. There is no reason why commercial plantings should not be made again as apples are successfully produced under much more severe conditions than exist in this locality. The St. Lawrence Valley, for instance, is famous for its Snows and McIntosh Reds, and these are grown to perfection in spite of winter temperatures which average several degrees lower than those experienced here. As stated above, the solution lies largely in the choice of hardy varieties, and these have, fortunately, been determined by careful and extended tests in the College orchards. Plantings made twenty or more years ago contained varieties which we now consider to have perfectly proven their commercial value for this section. These are Duchess, Alexander, Wealthy, Colvert, and Snow. To this list we would add McIntosh Red, as we are persuaded of its value after having observed the variety under many conditions elsewhere and after having tested it in our own orchard for thirteen years.

The second serious difficulty lies in the selection of a suitable location. A well-drained, elevated situation is essential to success, and, where these conditions can be combined with a southerly slope, success in fruit growing is then simply a matter of intelligent care. The College has been unfortunate in that suitable land for planting was not available when the present orchards were set out. Up to the present time the work done has consisted very largely of variety testing. The present orchards have fulfilled their purpose in this respect and valuable information concerning the behavior of varieties has been gained. Advance must be made, however, and although results in variety testing have been secured under existing unfavorable conditions, the nature of the work next to be taken up demands that conditions be made as favorable as possible. The future of fruit work here depends simply upon the acquisition by this department of land suitable to the purpose and on which fruit could be grown under the most favorable conditions of soil and location. There are many problems in fruit culture on which we should be able to speak with authority and which we are at present unable to study satisfactorily because of the lack of suitable equipment of this nature. We are firmly convinced, for instance, that apple production in this vicinity could be made profitable. As an educational institution we might logically be expected to *demonstrate* that fact, but on land such as we occupy at present an attempt at such a demonstration would be almost certain to fail. The climate of Guelph is fairly representative of that of a great proportion of older Ontario and such a demonstration, if successfully carried out, would be of the greatest value to all of the similarly situated inland and northern counties of the Province. It would be of great value, too, to the lake and southern sections of the Province in that many visitors from those important localities come to the College annually, especially during the summer months, and modern methods of orchard handling would through them become widely known. It would also enable those who are looked to for information on fruit subjects to speak with the authority which comes from actual experience in fruit production. It was our great privilege this past summer to visit some of the famous fruit-growing sections of British Columbia, Oregon, California, and Colorado. We were particularly impressed with the fact that the most up-to-date growers in these localities are usually the men who are in closest touch with their respective Departments of Agriculture, Agricultural Colleges or Experiment Stations. In each case the excellence of the equipment possessed is the measure of the interest taken by the growers. If this department is to be of value to the fruit growers of Ontario, it is imperative that suitable equipment be provided for the prosecution of experimental work, and we earnestly commend the circumstances outlined above to your careful consideration.

ORCHARD SURVEYS.

In co-operation with the Fruit Branch of the Department of Agriculture, Orchard Surveys were conducted in the Lake Huron district, Simcoe County, Kent County, and a portion of the Niagara district. Information was secured which will be valuable to the growers in the localities covered and to many others as well. Special reports on this work cannot be included here but will be issued by the Fruit Branch, Department of Agriculture, Toronto.

SPRAYING.

For a valuable account of experiments conducted in spraying for apple scab and codling worm, see the Report of the department of Entomology.

VEGETABLE GARDENING.

Mr. A. McMeans, in charge of experimental work in Vegetable Gardening, reports as follows:

The past season gave us very fair vegetable crops as a whole, though the spring was rather backward owing to continued wet weather. Growth came along with a rush and most crops will average up well.

The one exception was the onion crop. The date of seeding this year was rather late and when the plants should have been "bulbing out" they were attacked by thrips. This, combined with the dry weather at that time, cut the crop short at least 25 per cent.

Addresses were delivered to the onion growers of the Scotland and Leamington districts which resulted in the formation of co-operative associations by the growers of these districts for the better production and distribution of their onion crops. Addresses on various topics connected with vegetable growing were given at special fruit or regular Institute meetings at the following places: Collingwood, Leamington, Scotland, Oakville and Simcoe; at Toronto, to the members of the Toronto Branch of the Ontario Vegetable Growers' Association, and also at the annual convention of the Vegetable Growers' Association. Some judging was also done at a few of the fall fairs.

It was my privilege to spend some time in the chief cabbage and cauliflower sections of the United States, studying their methods of production, storage and marketing. This work was done for the Provincial Department of Agriculture on behalf of the Ontario Vegetable Growers' Association, and a full account of the same will appear in the Association's Report.

VARIETY TESTS.

Variety tests were carried on again this season, with results much the same as last year. For that reason they are omitted.

SEED SELECTION.

Valuable and encouraging work in seed growing and selection with beans, sweet corn, cabbage, and onions was continued from last year, but results along these lines are necessarily slow and as yet are not sufficiently advanced for publication.

IRRIGATION.

Owing to the continued dry weather this summer, it was thought advisable to try irrigation on some of the vegetable crops. For this purpose a small plot was set aside and equipped with the Skinner system of irrigation. Although it was rather late in the season, the effect on the plot of celery to which the water was applied was so noticeable that it is the present intention to enlarge the irrigation plant and test it out thoroughly on a number of vegetable crops next season.

KEEPING TEST OF ONIONS.

On October 3rd one thousand Globe Danvers onions were carefully screened, weighed, and marked. They were placed in slatted crates in an open shed along with the rest of the crop of onions. On October 31st, owing to cold weather, the crop was removed to the storage house for the winter. On April 27th the marked crates were again emptied on the screen and all loose peelings, growing and otherwise unmarketable onions, were removed. Following are the results: Original weight of 1,000 onions, 180 lbs.; unmarketable, 22 or 2.2 per cent.; weight of good onions, 164 1-4 lbs., a total shrinkage of 15 3-4 lbs., or 8.75 per cent.

KEEPING TEST OF VARIETIES OF ONIONS.

Variety.	Seedsman.	Percentage good.
Apple-shaped Red Globe	Vaughan	100
Icy Yellow	Maule	100
New Ebenezer	Johnson	100
Ailsa Craig	Simmers	99
Ailsa Craig	Vick	98
James Long Keeping	Ewing	98
Southport Yellow Globe	Steele-Briggs	98
Yellow Globe Danvers	Bruce	98
Michigan Globe	Ferry	98
Australian Brown	Simmers	97
Flat Danvers	Simmers	97
Market Maker	Rennie	97
Prizetaker	Steele-Briggs	97
Ailsa Craig	Sutton	96
Southport Red Globe	Bruce	96
Southport Red Globe	Steele-Briggs	96
Golden Globe	Burpee	*95
New Commercial	Maule	95
Southport White Globe	Steele-Briggs	95
Dark Red Beauty	Johnson	94
Model Yellow Globe	Bruce	94
Prizetaker	Bruce	94
White Portugal	Simmers	91
Red Wethersfield	Bruce	90
Red Wethersfield	Steele-Briggs	90
Gibraltar	Burpee	*63
Giant Brown Rocca	Steele-Briggs	22
Red Tripoli	Simmers	14
Early Rose	Burpee	12

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* Starting growth at the root.

Date of storage, October 3rd, 1908.

Date of examination, April 27th, 1909.

Length of test, 206 days. Conditions the same as test of Yellow Globe Danvers mentioned above.

Respectfully submitted.

J. W. CROW.

PART XIII.

THE PROFESSOR OF LANDSCAPE GARDENING.

To the President of the Ontario Agricultural College:

Sir,—I have the honor of presenting herewith my seventeenth annual report.

In doing so, it is a satisfaction to look back over the past and note the progress that has been made in all branches of Horticulture, both at the College and throughout the country, in these seventeen years.

When I first took charge of the department, the course in Horticulture was limited to about half a dozen lectures principally on fruit growing, given only to the sophomore students. Our curriculum now offers a comprehensive course of instruction on four of the leading branches of Horticulture, viz.: Pomology, or fruit growing; Olericulture, or vegetable gardening; Floriculture; and Landscape Gardening, and the work is now taken by the freshmen, sopohomore, and senior classes. Short courses adapted to the needs of special classes have also been arranged and are given every year to the ladies' classes from the Macdonald Institute, the Normal School teachers' classes in Elementary Agriculture and Horticulture, and to the short course class in commercial fruit growing. This all goes to show how rapidly our work at the College is growing, yet it is no more than keeping pace with the development and progress that is going on in the country all about us. The numerous horticultural organizations which have been formed, both amateur and commercial, in all branches of the work indicate how the horticultural interests of the province are developing and specializing, and if we are to keep pace, let alone lead, in this work our department here must still widen its scope and strengthen every branch of the work. No other department of the College serves a wider constituency than ours, for it is not limited to the country alone, but aids the town and city as well. We are not serving any limited section of the people, but the whole country.

Specialization of work and concentration of effort are the means we must adopt if we are to make our work still more effective. A start has been made in this direction by which Mr. Crow assumes control of the work in Pomology and Olericulture. The report under these heads will, therefore, be found in Mr. Crow's report.

Mr. Wm. Hunt has been giving good service in the floricultural section of the work, both at the College and throughout the Province.

With this division of labor, I have been able to give much of my time to developing the work in landscape gardening, a branch in which the call for definite and reliable information has become more and more urgent of late years.

I.—LANDSCAPE GARDENING.

It is apparent to all who read or travel that a wave of civic and rural improvement has set in on this continent. Our aim in this department is to promote the movement in every way possible, and we confidently look forward in the near future to a much better and more beautiful Canada. In this connection we may quote from a recent editorial in one of our leading daily papers, to show the attitude of the press to such work: "We freely pay every deserved tribute to those who strive to make Canada great and powerful. We recognize the services of those who aim to make the Dominion rich and prosperous. We have still higher honors for those who would strengthen the Dominion in virtue and the larger hope. Along these upward paths there is a growing appreciation of the truth that every high aim is furthered in many subtle ways by those who are doing their part in making Canada beautiful."

Whatever may be the calls for assistance from outside, as College instructors our first duty is to our students. Lectures as outlined in the College curriculum have been given to students of the Freshmen, Sophomore, and Senior years. Instruction was also given to the short course classes at the Macdonald Institute, and to the Normal School teachers' classes in the summer, and the short course class in fruit growing during the winter. As far as possible, use is made of our beautiful campus with its large collection of trees and flowering shrubs to demonstrate the practical application of principles taught in the class room. Free use is also made of lantern slides, a valuable collection of which has been prepared for the purpose, which enables the eye to catch and fix on the mind impressions which could not be gained in any other way.

MEETINGS AND CONVENTIONS.

During the year I have been privileged to attend a large number of conventions and meetings where I had the opportunity of speaking and helping on local improvements in both town and country. Addresses, nearly all of which were illustrated with stereopticon views, were given at the following places: Hamilton, Brantford, Oakville, Parkhill, Smith's Falls, Simcoe, Guelph, Ottawa, Toronto, Macdonald College, Ste. Anne de Bellevue, Vankleek Hill, Napanee, Elmira, Sutton West, St. Davids, Huntsville, Winona, Forest, Preston, Walkerton, Owen Sound, Clarksburg, Stratford, Oshawa, Woodstock, Galt, Picton, Niagara Falls and St. Catharines.

Some of these meetings were held under the auspices of the local Horticultural Society, others were under the auspices of the Agricultural Society, the District Improvement Society, the Board of Trade, the Scientific Association, the Teachers' Association or the Educational Association. By a careful observation and study of the local conditions previous to these talks, an effort was made to made them as practical and directly applicable to the immediate needs of the community as possible.

Assistance was also given at exhibitions by judging fruits at the Canadian National Exhibition, Toronto; the Ontario Fruit, Flower and Honey Show, Toronto, and a number of county and township exhibitions.

An event of more than local importance was the meeting of the American Pomological Society and the Society for Horticultural Science at St. Catharines in September last. These important international associations were brought to Canada as the result of an invitation we were privileged to join in extending to them at their last biennial meeting at Jamestown, Va., in 1907. When in Canada these associations accepted an invitation to visit the College and came in a special train and spent the day with us on September 18th.

IMPROVEMENTS ON COLLEGE CAMPUS.

Following the removal of the row of large Norway spruce at the front of the campus, which had become very unsightly, a new cement walk was laid last spring along the whole front, and an irregular border made up of clumps of flowering shrubs was planted in the space left by the removal of the spruce. This has added greatly to the appearance of the place, and will in a few years transform that unsightly part of the campus into a beauty spot.

Plans have also been prepared for the systematic laying out and planting of the grounds about the Macdonald Hall, Institute, and Consolidated School, which have only recently come under the charge of this department. The planting of these grounds will therefore be undertaken as soon as weather permits next spring.

IMPROVEMENT OF SCHOOL GROUNDS.

As a result of the distribution of the bulletin on the "Improvement of School Grounds," prepared by us for the Ontario Educational Department last year, there have been a great many requests from School Boards and Boards of Education for assistance in planning school ground improvements. Over forty schools have been so aided during the year. These have been scattered all over the country, from Niagara Falls to Fort William, and from Essex County to Prince Edward. This we look upon as a most important form of College extension work, for we believe that the general improvement of school grounds will soon show itself in the improvement of the homes of the people in both town and country, and in probably no other way could we reach the people more directly and effectively than through the schools of the country.

Prominent among the educational institutions where we have aided in improving their grounds this year are the Normal Schools at London, Stratford and Peterborough, and the Ladies' College at Whitby. The planting at London was completed last spring and at the other places mentioned the grounds were levelled and graded and prepared for planting next spring.

It is interesting to note that the desire for such improvement is not confined to the larger centres in Old Ontario, for the pioneers in the sparsely settled townships of New Ontario have also appealed to us to help in making their schools and school surroundings more nearly ideal. At the request of the trustees of the Hudson Township school located north-west of Cobalt, we visited that district last spring and gave assistance in locating and planning improvements for a new school in that northern section of the Province.

SCHOOL AND HOME GARDENS.

The various attempts that have been made to introduce agriculture in the rural schools of Ontario have clearly shown that the problem cannot be solved simply by the introduction of text-books upon the subject. Something more practical is necessary. The idea of giving the children an opportunity of learning the elementary lessons of plant growth through their own little gardens appears to be the simplest and most direct method of reaching the end desired. In connection with Professor McCready, of the Nature Study Department here, we have been making an effort to further this work by interesting the teachers. Through the co-operation of the school inspectors, we were able to get in touch with the teachers in each inspectorate who are most interested in such work and would direct the children in the care of a little garden plot, either at the school or at home. We undertook, through the funds of the Experimental Union, to furnish the seeds and instructions necessary for beginning such work.

As a result of this effort we feel that a good start has been made. Seeds were distributed last spring to one hundred and forty schools, and over six thousand children were engaged in the care of these little garden plots this year. Most of the plots so far have been at the homes of the children, where parents and other members of the family could also take an interest in them. Probably from an economic as well as an educational standpoint, these little garden plots were better at the homes of the children than anywhere else, but we believe in time the necessity for locating them on the school grounds will become more and more apparent, and will lead to a general introduction of school gardens. Reports from the teachers on the success of the work so far are now being received, and a fuller account of which will be found in Prof. McCready's report before the Experimental Union.

AIDING OTHER PUBLIC INSTITUTIONS.

It is some satisfaction to us, and no doubt more or less of a credit to our institution, that we are able to reach out and help other institutions engaged in other branches of the public service. Such assistance has at all times been given freely and gladly, and we hereby offer a helping hand in so far as we are able to any public institution in need of such assistance as we can give. Among the institutions other than schools and colleges we have helped during the year by advice and suggestive plans for planting and improvement have been the following: The South Lanark Agricultural Society; the Hospitals for Insane at Penetanguishene and London; the General Hospital, London; the Elliott Home, Guelph; the Brantford Golf Club; the Cemetery Board, Stratford; the Park Board, Smith's Falls.

LESSONS FROM THE WEST.

It was my privilege last summer to take a trip through the Canadian North-West as far as the coast. Through the kindness of one of our old students now in charge of the Forestry Branch of the C. P R., I was enabled to get in close touch with what is being done by that great railroad, and also in many towns and cities along the line, in the way of tree planting, station ground improvement, park management, care of streets and boulevards, etc. It was very clear to us that we in the east have much to learn from our more progressive neighbors of the west, particularly in the planting of trees along the railway right of way, improvement of station grounds, and making and maintaining of boulevards. Many photographs were taken which will be made use of in promoting such work in Ontario.

II.—FLORICULTURE.

The following report is prepared by Wm. Hunt, Lecturer in Floriculture in this department, who has direct charge of the work in floriculture.

TEACHING.

The teaching in connection with this subject has increased considerably during the past year or two. This has been due largely to larger classes of students at both the College and Macdonald Institute, and additional classes in connection with the summer school courses in Elementary Agriculture and Horticulture for Normal School teachers. Naturally this has made an increased demand upon our resources for space and material to carry on the work successfully. We are making the best use possible of the space at our disposal, but we are in need of more greenhouse accommodation to meet the requirements of our classes.

CORRESPONDENCE.

This phase of the work is also increasing year by year, there being a growing demand for information on all features connected with plant and flower culture. To meet this growing demand, a number of articles on floriculture topics have been contributed from time to time to horticultural magazines.

CONVENTIONS AND EXHIBITIONS.

In addition to my regular college work, I have addressed a number of meetings throughout the country, and acted as judge at horticultural exhibitions at the following places: Brantford, Elmira, Owen Sound, Fergus, Stratford, Elora and Tillsonburg.

In conjunction with Mr. A. McMeans of this Department, I also inspected and made the awards in connection with the Guelph Horticultural Society's Lawn, Flower, and Vegetable Garden competition. These competitions have been productive of much good in arousing interest in such work in the city.

CHRYSANTHEMUMS.

In the succession of floral displays in our greenhouses throughout the year, probably none arouses more interest than the chrysanthemums. Our collection of these has been kept up to date by the introduction of the best new varieties, and in this way we have already tested over four hundred kinds. The following have been selected as a few of the most desirable of the newer kinds representing the various types:

POMPON, or small double flower type, particularly suited for pot culture:
Snowdrop. Very profuse flowering habit, having pure white double daisy-like flowers.
Alena. Pale silvery pink. Free flowering. Very attractive.
Klondike. Bright yellow. Very showy and conspicuous.
Rose Marguerite. Anemone pompon. Deep rose. Free flowering.
Julia Lagravere. Deep red. One of the best of its color.
Panama. Rich bronzy red tipped with old gold. Very pretty.
Julia. Bronzy amber. Distinct and pretty.
Baby. The smallest pompon grown. Bright yellow. Odd and unique.
Beatrice Asmus. Pure white anemone flower. 2½ inches across. Beautiful for sprays.

SINGLE FLOWERING TYPE:
Anna. Pure white. Free flowering. Petals twisted and rolled. One of the prettiest.
Ladysmith. Pale pink. Good pot plant. Pretty.
Lady Lu. True single. Pure white. Attractive flower.
Lily Beer. Pale lemon yellow. Free flowering.
Miss A. Holden. Pale straw color. Suffused magenta.
Miss Dorothy Deneen. Rose pink. Petals half quilled. Attractive.
Mizpah. Reddish crimson. Valuable for its free flowering and dwarf habit. Not new.
Golden Chain (Indicum). One of the oldest types. Small yellow flowers. Profuse. Trailing habit.

LARGE FLOWERING TYPE: The following are good varieties for pot culture:

Early Snow. Pure white. Early. Free. Good habit. An acquisition among the early varieties.

Frison d'Or. True incurve. Color rich bronzy red, margined and tipped old gold. Beautifully feathered.

Golden Glow. Rich golden, incurve. Early. Good habit.

Golden King. Golden yellow. Dwarf habit. Early.

Improved Chadwick. Pure white incurve. A superb flower.

Pacific Supreme. A good early pink.

Rose Pockett. Very large tassel-shaped, bronzy yellow flowers. Unique.

White Cloud. Very free flowering. Large flowers. Habit rather too tall for pot plant.

NEW GERANIUMS.

About twenty of the newer varieties of these have been tested. The following single varieties have points of merit that make them worthy of a place on the list with the standard older varieties. None of the double varieties tested were of sufficient merit to warrant special mention.

Alice of Vincennes. Large truss. White, suffused and margined carmine and scarlet Aureole type of flower.

Eugene Sue. Immense trusses of bright scarlet.

Sir Fred Trevor. Crimson scarlet. White eye. Large flower.

The Sirdar. Brilliant scarlet. White eye. Very large flower.

Tiffin. Scarlet, upper petals, shaded magenta. Robust grower. Good bedder.

ANNUALS.

About one hundred varieties of annuals were grown in the flower borders this year. The following include some of the more recent introductions worthy of note:

Dimorphotheca aurantiaca (Namaqualand Daisy). A pretty little annual, having a glossy salmon-orange shaded flower with black central ring, something like *Gazania splendens.* A good annual for a sunny border.

Eschscholtzia. (Dainty Queen.) A delicate coral pink, flower margined and suffused with a darker shade on ground work of cream color. Dwarf. Compact. 1 ft.

Eschscholtzia. (Mandarin.) Flowers of a deep orange color shading almost to crimson. Dwarf. Compact habit.

White Mignonette. (Reseda alba.) Long spikes of white flowers. Very free flowering. Robust habit. 2 ft. Very useful for summer cutting.

Sunflower. (Starlight.) Flowers canary yellow. Petals twisted very prettily like a Cactus dahlia. Useful as a border plant or for cut flowers. A valuable addition to our hot weather flowers.

GLADIOLI.

In a test extending over a period of three years of about two hundred named varieties of these popular flowers, the following have been selected as being the best twenty-five kinds for the amateur grower. The choicest of these are marked with an asterisk to make a list of one dozen.

**Afterglow.* Salmon fawn shade, with pale blue centre. Large flowers. Massive spike.

**America.* Pale delicate pink. Large flowers. Strong habit.

**Augusta.* White with blue anthers. Large spike. Lateral spikes well developed.

Attraction. Deep rich crimson. White throat. Medium grower.

Baron Joseph Hulot. Deep violet blue. Medium flower.

**Blue Jay* (Groff). Purplish blue with lighter shadings.

Brenchleyensis. Bright scarlet. Large spike. Strong grower.

**Dawn* (Groff). Pale salmon shaded lighter, suffused with carmine or claret on inferior petals.

**Evolution.* Delicate rose shaded darker. Attractive.

**Eugene Scribe.* Pale rose shaded carmine. Good habit.

George Paul. Deep crimson shaded yellow, spotted violet-purple.

Giant Pink. Deep rose pink with markings of deeper pink. Strong grower.

Jane Dieulafoy. Creamy yellow, blotched crimson.

Lady Howard de Walden. Bright yellow, inferior petals flaked with carmine.

**La Luna.* Creamy yellow, heavily blotched with chocolate carmine.
Little Blush. Creamy white shaded yellow, heavily striped and shaded yellow.
Meadowvale. Almost pure white, slightly shaded crimson and pink,
**Peace.* White, slightly suffused pale carmine. Large spike. Very conspicuous.
Philadelphia. Deep pink, shaded and diffused lighter. Strong grower.
**Princeps.* Bright red. Lower petals streaked and blotched lighter.
**Prophetesse.* Pearly white with maroon blotch. Round, compact flower.
Rosella. Light rose shaded purple and white. Large flower.
Scarsdale. Lavender. Strong grower.
**Victory.* Bright yellow. Large spike and flower.
Wm. Falconer. Creamy rose shaded and spotted red and carmine.

OUT-DOOR HARDY ROSES.

About one hundred kinds were added last spring to the collection of roses planted in 1907, which now makes the collection fairly representative of these popular flowers. Many of those planted last spring flowered during the summer, but as yet they have not been sufficiently tested to warrant publishing results as to their suitability for general planting. Those planted out in 1907 have done well the past two seasons and were greatly admired by our summer visitors. After two season's tests the following can be recommended as most desirable for garden roses:

BUSH ROSES:
Alfred Colomb. Reddish crimson.
Anna de Diesbach. Silver pink.
Baron de Bonstetten. Dark crimson.
Dinsmore. Dark crimson.
Earl of Dufferin. Purplish crimson.
Eugene Furst. Velvety crimson shaded maroon.
Frau Karl Druschki. White. A continuous bloomer.
General Jacqueminot. Scarlet crimson.
John Hopper. Rosy pink.
Mount Carmel. Deep reddish pink.
Oakmont. Silvery pink.
Paeonia. Bright crimson.
MOSS ROSES:
Blanche Moreau. White.
Crimson Globe. Crimson.
Princess Adelaide. Pink.
RUGOSA ROSES:
Agnes Emily Carman. Crimson. Semi-double.
Rosa rugosa. Crimson. Single.
Rosa rugosa alba. White. Single.
CLIMBING ROSES:
Crimson Rambler. Crimson double.
Dorothy Perkins. Pale dainty pink.
Queen Alexandra. Pale pink.
Wm. Egan. Pale pink.

Of the more tender species of roses, such as Hybrid Tea, Tea Scented or Ever Blooming, and the dwarf Polyantha roses, very few of those tested have given good results even with extra protection and care during the winter. The high altitude and the exposed position of our grounds are doubtless the causes of failure. The only two varieties that have given really good results are Hermosa, a soft pink rose of the Bourbon type, and the Baby Rambler, a bushy, dwarf growing variety similar in color and flowering habit to the Crimson Rambler. Both Hermosa and Baby Rambler gave a splendid succession of bloom from July until early in October. Tests are being made with a number of the Rambler roses to determine their suitability for general planting.

Respectfully submitted,

H. L. HUTT

PART XIV.

THE PROFESSOR OF POULTRY HUSBANDRY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith the report of the Poultry department for 1909.

Teaching scarcely needs a detailed report. The work has been much the same as in previous years, that is, lectures to the regular College students, Short Course students, Poultry Institutes, Farmers' Institutes, etc.

This has been one of the most successful years in the history of the department. We have been able to raise more and better stock than in previous years. Not only has the stock been healthier, but it has grown larger, matured earlier, and is of better quality from the show-room standpoint. A few fair show birds are required for class-room work. We do not pretend to make a specialty of breeding exhibition stock, but we are trying to breed birds that will yield a profit by their eggs or flesh production and at the same time be fair representatives of their breeds.

The great majority of our people are interested in the hen that lays rather than in a bird valued for its beautiful form or plumage. I believe that the beauty of a bird need not detract from its power to produce either eggs or meat, and we hope in time to breed much better color in some of the families that are deficient in this respect, but are good layers or meat producers.

We can house comfortably about eight hundred birds. This allows us to use Houses Nos. 1 and 2 largely for class-room work—each pen having a different variety. The birds are also used for pen practice by the Short Course students. The balance of the houses are used almost entirely for experimental purposes, either in breeding, feeding or as to design of houses suitable for this climate. This branch of the work grows from year to year and I have no doubt that in the near future we shall be asking for more houses to test problems in the various lines as they present themselves. There appears to be endless work ahead; the trouble is to know which problem to attack.

HOUSES.

For five years we have been working with four designs of houses which have been described in previous reports, and also in Bulletin 151. The results each year point in no unmistakable manner to the necessity of an abundance of fresh air in the house, and, moreover, that there shall be no direct drafts across the birds. The warm, well built, tight house has not given satisfactory results in any winter. This house no doubt could be managed to give better results by leaving the door or a portion of the windows open, but if so managed it would then be similar to the single ply board houses as far as temperature was concerned. I think we have fully demonstrated that elaborate, expensive houses are not an essential for a good egg yield in winter. Cold air, if the house is dry and free from drafts, is not a serious detriment. One of the houses has been as low as 7 degrees below zero in the centre of the building.

The following record shows in a concise form the difference in the percentage of egg production in favor of the cold or fresh air house during the five years for the months of December, January, February and March, the first year beginning December, 1904-05, 76 per cent.; 1906, 8 per cent.; 1907, 11.8 per cent.; 1908, 15.6 per cent.; 1909, 12.4 per cent.

The house with a cloth front and the one with movable windows compare favorably with the cold houses. There is probably not enough difference in the actual egg production to warrant a statement that either of these houses is very much inferior to the cold house. They are about 3 degrees warmer than the coldest house and about 15 degrees colder than the warm house.

Large or Small Flocks in a House.

For three years we have been comparing flocks of 50 and 100 with the same floor space per bird. Our results are in favor of the smaller flock. No doubt an expert can get very good results from flocks of one hundred, but the ordinary attendant will do better with two flocks of fifty each.

We are working with some low down movable houses that will accommodate 15 to 20 birds. These have nearly one-half the south side covered with nothing but wire netting. They worked well last winter, possibly with a good cold, stormy winter the results might be different.

Late or Early Hatched Pullets.

The large and small flock test above was made with pullets. We were fortunate in having April and June hatched pullets of exactly the same breeding so that we could make a comparison of egg production as influenced by age. The records were kept from Nov. 1st to July 1st. The April pullets averaged 77 eggs each, while the June pullets laid but 48 each. The June pullets laid no eggs before January. The feed cost 70 cents per bird for the above period, which means that the eggs from the April hatched pullets cost 12 cents per dozen while those from the June hatched pullets cost 17.5 cents.

A Small Profitable Flock.

A number of inquiries are received each year as to what it costs this department to keep a hen for a year and as to how many eggs she lays, etc. To answer in a general way these inquiries the experiment as given below was conducted.

Stock. Twenty-five May hatched White Wyandotte pullets and two males were used in this trial. There was no particular reason why we did not use some other breed. These birds were used largely because they were nearly of the same age; they represented at least three families of the breed and were hatched about the same season of the year when most farmers hatch their chickens. They were well grown on what might be called free range, that is, in the College orchard, and were moved into winter quarters about Oct. 15th, 1908. The experiment began November 1st, and was continued for one year.

Housing. The house used was not an expensive one, nor yet was it new. I do not know the exact age of the building, as it was constructed before I was given the management of the department. The ground surrounding the building has had fowl upon it for at least twelve years. No advantage, whether real or apparent, can be charged against these birds, for new ground, new buildings, or expensive building. The house is 10 feet wide by 14 feet long; is 4 feet high at the eaves and is seven feet high in front. It is built of single ply boards, the cracks between the boards being covered with battens. A rough manure shed was built in front of the house as a feeble imitation of a farm barnyard. We found it necessary to cover the shed on account of the snow. The shed was constructed of old rough boards and was not tight—the wind could blow through quite freely. The floor of this shed was covered to a depth of about one to two feet with horse manure. Some fresh manure was added every week or so, and about an equal amount taken away. We hoped the birds would exercise themselves out in the shed, but in this respect it was not a success. I doubt very much if there was any advantage with the shed except an abundance of fresh air and more room in which to move about. The yard surrounding the house is well sodded and is practically 60 feet square.

Feeding. During the winter, grain was fed in deep straw litter in the morning and usually in the evening. About twice a week during the winter some wet mash was given at night in place of the whole grain. Clover hay was always available from the rack in one corner of the pen, as was also grit and oyster shell. Roots were given once or twice a week during the winter when we could get them, probably a bushel would be all this pen had. Cooked meat was fed a few times at noon, as was also cut green bone. For most of the year a hopper of beef scrap was constantly available. This was closed when either meat or bone was fed, or when milk was given to drink, as was done during the hot summer months.

The feed consisted mostly of wheat and corn with some oats. The mashes were made of bran, shorts, oat chop and corn chop; in some instances, barley or buckwheat chop was used or we used what we had, only that we tried to have at least some bran and middling in all mixtures.

Feed Consumed and Value According to Local Markets.

Feed.			Value.
Corn,	256 lbs.	at $1.60 per cwt.	4 10
Wheat,	563 "	at $1 per bushel	9 39
Mash,	220 "	at $1.50 per cwt.	3 30
Mixed Corn Wheat,	347 "	at $2 "	6 94
Meat food,	117 "	at $3 "	3 51
Milk.	700 "	at 20c "	1 40
Roots, Hay, Oyster shell, etc. (estimated)			1 00
Total cost			$29 64

Mixed grain was fed during the summer when wheat was worth $1.30 per bushel, hence the charge of two cents per pound.

Eggs Laid and Value According to the Local Market.

Month.	Number.	Price per doz.	Value.
			$ c.
November	17	.30	0 43
December	95	.36	2 85
January	358	.36	10 74
February	280	.30	7 00
March	320	.24	6 40
April	377	.18	5 51
May	311	.18	4 67
June	377	.18	5 51
July	304	.24	6 08
August	266	.24	5 32
September	194	.24	3 98
October	154	.30	3 85
Total			62 34

There yet remains at least one item that must be considered, and that is, the number of birds that have died. In this particular pen the death-rate has been very high—a total of five birds. Of the five, three died in the nest laying, one in May, one in June and one in August. In this house we used trap-nests and the birds may have suffered from being left in the nest too long during very warm days. To me the most interesting part of this experiment is the cause of the deaths. When we examine the egg record we find the deaths occurred among the birds that were slow in starting to lay—two of them not laying until after the middle of March. To the ordinary poultryman this result would have been more or less expected, as he is aware that where pullets have all they want to eat during the winter, a few non-producers will get overfat, as indicated by the large development of fluff. Such birds should be sold to market as they seldom make fair layers. One bird laid but 19 eggs before she died, and 56 was the most laid by any of the others. I believe these hens ate too much meat and beef scrap. We wanted them to have the opportunity to eat all they would. The results were satisfactory as far as the producers were concerned, but the pullets that failed to lay during the winter were very fat. Many of the heaviest layers were rather too thin. A feeder with but one flock has at times to sacrifice a few for the many.

There are practically 24 months of feeding for one bird lost by the death of five hens, hence our feed bill for the twelve months represents practically the feed of 25 birds for the year.

The value of the five birds lost should be charged against the pen. Whether one should charge in this particular instance, the labor, rent of land and house is debatable.

FINANCIAL STATEMENTS.

Cost of Foods	$29 64	
Loss of 5 hens at 50c. each	2 50	
Value of eggs		$62 34
Profit	$30 20	

A further analysis shows the following:

Grain consumed per bird	55.5 lbs.	Four birds laid more than	200 eggs
Grain cost	94.12 cents.	Nine birds laid less than	100 "
Animal food cost	19.64 "		
Average laid per bird	122 eggs.	Average profit per hen	$1 20

No charges have been made for labor, and no credit for manure.

HATCHING AND REARING.

The new incubator house has been very useful to us during the past year. We have been able to hatch more chickens with less labor, and moreover, the death rate among the chicks was not so large as in previous years. Just how much of this is due to ventilation of the incubator house is very hard to determine. The loss from all machines, including the numerous experimental operations, was a trifle over 30 per cent. This, of course, is much higher than we would like, but, nevertheless, is perhaps near the average commercial plant.

We have not as yet been able to find any method by which we can always avoid the so-called "White Diarrhœa" disease. We have this season, as in past years, gotten our best chicks from machines washed with a ten per cent. solution of a tarry compound. This is done immediately before the eggs are put in the machines.

A number of operators have reported very satisfactory results from the above treatment, but at the same time there have been a few failures, possibly due to the fact that there appears in some instances to be more than one organism to deal with.

There can be no doubt that much can be gained from breeding from but the strongest and most vigorous stock, and in addition, one should breed only from well matured birds. The stock, the feed, the housing, etc., are factors which must be as nearly ideal as possible in order to get good hatches and low mortality.

The past season with us was unusual in that eggs set during January hatched exceptionally well, even when all the machines were operated by students. The average hatch was nearly fifty per cent. of the eggs set. Eggs set during March and early April did fairly well, but eggs laid from April 15th to May 15th were not nearly as good for hatching as we usually have them. The late season and long confinement were, in a measure, weakening to the birds.

To rear good chickens at a reasonable cost is within the reach of every farmer. We find that we can grow a chicken very easily if raised upon the farm or what is termed free range. The colony houses are placed in the orchard, pasture field, and corn fields. If the birds are not too crowded on the land, they do but little damage to the crops and no doubt do much good in the way of destroying insects. We have not as yet, under above conditions, put more than one thousand chicks on fifteen acres of land. This gives the birds plenty of range over fresh ground and moreover, reduced the labor of caring for them. After the chicks are about six weeks of age they are fed entirely from hoppers or boxes. These are large enough, or in sufficient numbers, to hold a week's feed. The water is supplied by the barrel so that we have to feed, water and clean the houses but once each week. We have not as yet been able to avoid the necessity of shutting the houses each night. There are so many animals prowling around at night that we cannot leave any houses or coops open. We find the colony house much more convenient for shutting at night than the small coop for a hen and chicks, for the reason that it takes no more time, if as much, to shut a hundred birds in a house than it takes to securely fasten fifteen in a little coop.

The method of feeding adopted is very simple. When chicks are put in the brooders, whether hen or incubator hatched, we try to give them new milk to drink for the first week. We cannot always do this, but it starts them better than water and often saves some of the tardy ones who hardly know what or how to eat.

The feeds used are cracked wheat, cracked corn and pinhead oatmeal in equal proportions. A dry mash of bran, corn-meal, low grade flour and middlings is fed after the chickens are a few days old. They like this mash very much and would probably eat too much if left constantly before them. We usually add, say a teacupful of powdered charcoal to a gallon of the mash. The chicks are fed five times daily until two weeks old, then three times until about six weeks, after which they are fed from hoppers. This method is for late March, April and early May birds. Those hatched later when they can run out of doors practically all the time, are fed from the hoppers from the first feed.

COST OF REARING.

We were able this season to keep an exact record of the birds grown in the pasture field and of those grown in the orchard. The chickens in the pasture field were hatched during the first two weeks of May. Three hundred and forty-five birds were grown to maturity or a size suitable for fattening. We began to remove the cockerels from the field to the fattening pens August 25th. The pullets and cockerels held as breeders were all taken from the field by 22nd of October. The breeds reared were Orpingtons, Wyandottes, Plymouth Rocks, Leghorns, etc. They consumed 4,304 lbs. of grain; of this, about one-third would be dry mash, nearly 300 lbs. of chick food and the balance of wheat, corn and hulled oats in the proportion of 2½, 2 and 1. There was five per cent. of beef scrap added to the dry mash. The birds were weighed when taken from the field, weighing 1,341 lbs., or a pound of chicken represents 3.2 lbs. of grain. Some of the breeding cockerels weighed over seven pounds and the Leghorn pullets did not average three pounds in weight. We removed most of the cockerels at about a three and one-half pound weight or when they would fatten most economically.

The chickens reared in the orchard varied more in ages. The first were hatched the 25th of April, and the last, July 6th. Most of the birds were hatched in May. We sold 218 as broilers from this lot during July. The later cockerels were removed to the fattening crates as was done with those grown in the pasture field. Most of the pullets were taken out about the first of October and by the first of November practically all had been removed with the exception of about one hundred—these were cockerels held as breeders and the July chicks.

We raised in this field 773 chickens at a cost of 8,649 lbs. of grain. A pound of chicken equals 2.34 lbs. of grain, or nearly the same as the pasture field chickens.

The figures mean that a farmer can in his fields raise a four-pound cockerel for thirteen of fourteen pounds of grain. This amount of grain at thirty dollars per ton, would be worth twenty-one cents. The cockerel would sell in the market for at least forty cents, and if fattened would be worth sixty cents. The data we have on hand would indicate that it costs about five to seven cents each to hatch the above birds, that is, figuring eggs, oil and losses.

NEEDS OF THE POULTRY DEPARTMENT.

If we are to continue the work already begun in breeding for heavy egg production, hatching quality eggs, etc., which are of vital importance to the industry, we shall require more assistants, as the mass of record keeping, etc., is much more than we can now attend to properly, to say nothing of the growth from year to year.

Respectfully submitted,

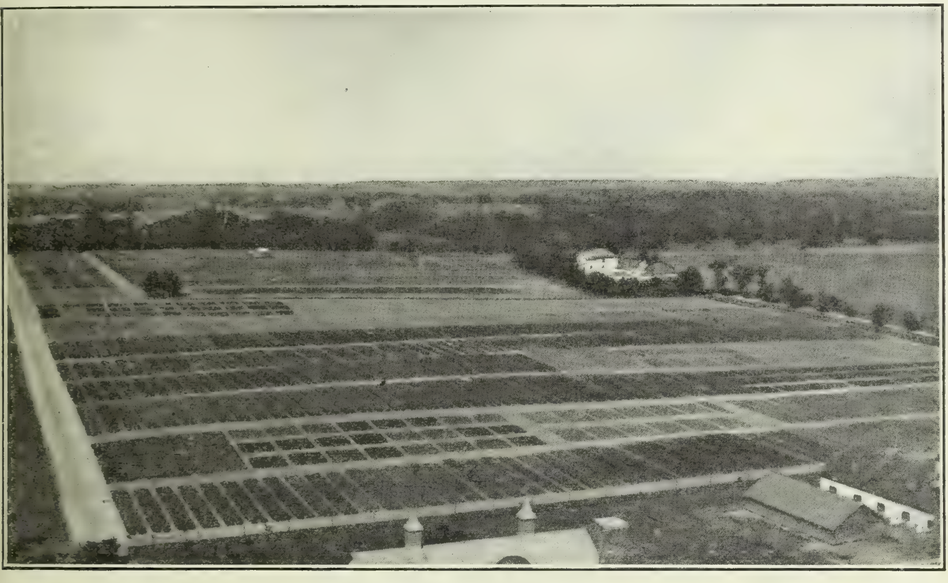
W. R. GRAHAM.

PART XV.

THE PROFESSOR OF FIELD HUSBANDRY AND DIRECTOR OF FIELD EXPERIMENTS.

To the President of the Ontario Agricultural College:

SIR,—It is my pleasure to submit to you the report of the work done in the department of Field Husbandry for the year 1909. The work of the past year has been carried forward with energy, and the results, on the whole, I consider very satisfactory. The students of both the long course and the short courses have shown a deep interest in the work in the class-room, the laboratory and the field. The experiments in Field Husbandry at the College have been conducted along many important lines, and the co-operative work throughout Ontario has been more extensive and valuable than in any year previous. That there is a deep interest shown by the farmers of Ontario in the work of the department of Field Husbandry is manifest from the fact that very large numbers visited and examined the experimental plots during the summer season, and that the inquiries made through correspondence have been unusually large. The requests from various Ontario organizations to assist in conducting short courses, in delivering lectures, and in judging at fall fairs, seed fairs and larger exhibitions have been so great during the past year that, while we have complied with many, we have been unable to respond to all of these numerous invitations.



A partial view of the Experimental Grounds in 1909.

OUTLINE OF WORK DONE DURING THE YEAR.

In order to give more definite information regarding the various requirements of the department of Field Husbandry, the following concise outline of the work of the past year is here presented:

1. Delivering lectures and giving demonstrations before the classes in the regular course at the College, as outlined in the College Calendar.

2. Delivering nine lectures before the students in the short course in Seed and Stock Judging, eighteen before the students from the Ontario Normal Schools, and four before the Public School teachers attending the summer course in July.

3. Conducting experiments in Field Husbandry on fully 2,000 carefully measured plots at the Agricultural College.

4. Improving the leading varieties of cereal crops by means of systematic selection and by cross-fertilization, there being 123,852 hybrid plants grown separately in the experimental grounds in 1909.

5. Explaining the experiments in Field Husbandry to thousands of farmers, members of the Toronto branch of the Canadian Club, members of the Press Association, and numerous persons connected with agricultural colleges, experiment stations, seed firms, etc., coming from near and far, and visiting the College and inspecting the experimental grounds in the summer season.

6. Conducting co-operative experiments on 4,856 farms throughout Ontario, Results of the successfully conducted experiments will be found in the Annual Report of the Ontario Agricultural and Experimental Union.

An excursion party visiting the experimental plots.

7. Writing agricultural reports and bulletins, including the report of the department of Field Husbandry at the College, the Report of the Co-operative Experimental Work throughout Ontario, and the articles which are sent to the farm journals and newspapers throughout the year.

8. Carrying on a very large correspondence with farmers, seedsmen, fertilizer manufacturers, experiment station officers, and others throughout the entire year. At some seasons, the letters received number about two hundred per day.

9. Delivering addresses at various gatherings of farmers and others throughout Ontario, as follows:

By the Writer. One at the Canadian Club, Toronto; three at the Ontario Agricultural and Experimental Union, Guelph; one at the Ontario Fairs Association, Toronto; one at the Annual Meeting of the Ontario Corn Growers' Association, Essex; one at the Seed Fair, Haliburton; one at the Farmers' Club, Preston; and one at a complimentary luncheon given at the City Hall, Guelph, in connection with the Winter Show. Besides these, the writer delivered one address before the annual meeting of the British Association for the Advancement of Science, Winnipeg; one address before the American Breeders' Association, Columbia, Mo.; one address before the State Corn Growers' Association, Columbia, Mo.; and one address at the annual banquet at the State University, Columbia, Mo.

J. Buchanan. Two at the Farmers' Institute meeting at Appin, two at Glencoe, and two at Wardsville; one at the annual meeting of the Farmers' Institute at Brigdon, one at Appin and one at Sutton West; one at a meeting of the Farmers' Club, Galt; one at the Winter Fair, Guelph.

W. J. Squirrell. Two addresses at the Farmers' Institute meeting at Rothsay, two at Palmerston, two at Mount Forest, two at Kenilworth, two at Conn, and two at Cedarville; and one at the Farmers' Institute meeting at Alma; one at the annual meeting of the Farmers' Institute at Owen Sound and one at Belwood; two at a meeting of the Farmers' Club at Laskay; and one at each of the Seed Fairs of Fergus and Elora.

The judges of standing field crops having a practical test at the College before starting to judge crops throughout Ontario.

A. W. Mason. One address at the Seed Fair at Mount Forest and one at Mitchell.

C. R. Klinck. Two addresses at the Farmers' Institute at Ravenna, and one address at the Seed Fair at Richmond Hill.

10. Judging grains, etc., as follows:

By the Writer. The Provincial Winter Fair, Guelph, and the Spring Seed Fair, Guelph.

J. Buchanan. Canadian National Exhibition, Toronto; Fall Fair, Essex, and Winter Fair, Guelph.

W. J. Squirrell. Seed Fairs at Elora and Fergus, and Fall Fair at Guelph.

A. W. Mason. Seed Fairs at Mount Forest and at Mitchell, and the Fall Fair at Simcoe.

C. R. Klinck. Seed Fair at Richmond Hill.

A. E. Whiteside. Autumn Seed Fair, Guelph.

11. Conducting short courses in Seed Judging, as follows:

By the Writer. Lindsay, Victoria Co.; Ayr, Waterloo Co.; Carleton Place, Lanark Co.; Picton, Prince Edward Co.; and Hickson, Oxford Co.

J. Buchanan. Creemore, Simcoe Co.; Alliston, Simcoe Co.

C. R. Klinck. At the following places in Prince Edward Island: Malpeque, Tyne Valley, Springfield, Georgetown and Tracadie Cross.

12. Inspecting different sites for the new Central Prison, and reporting on the same, at the special request of the Provincial Secretary.

13. Furnishing plans, seeds and instructions for demonstration plots at the exhibition grounds at Simcoe; and assisting in various ways, and furnishing seeds and instructions to the county representatives of the Ontario Department of Agriculture.

14. Fulfilling the duties required of the Secretary of the Ontario Agricultural and Experiment Union, the Vice-President of the Canadian Seed Growers' Association, the Chairman of the committee on breeding cereals of the American Breeders' Association, the Secretary-Treasurer of the Macdonald Consolidated School, a member of the programme committee of the American Society of Agronomy, a member of the seed committee of the Ontario Provincial Winter Fair, etc.

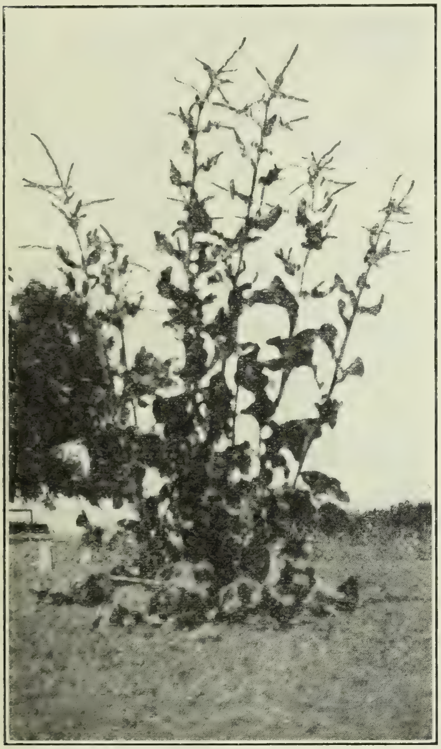
I take this opportunity of expressing my great appreciation of the excellent services rendered by the efficient and willing staff of workers in my department. Mr. John Buchanan, B.S.A., lecturer in Field Husbandry, has taken a greater part of the lecturing in connection with the regular college course. He has also conducted the greater part of the examinations during the past year. Mr. W. J. Squirrell, B.S.A., has done excellent work, especially in the taking of notes in the Experimental Department, in the preparation of material for the reports, in imparting information to the farmers when visiting the College in excursion parties in the month of June, etc. Mr. A. E. Whiteside, who has been foreman of the department for more than a dozen years, has had charge of the men and the students when at work in connection with the various experiments, and has also given excellent assistance in planning experiments and in making careful records of the same. Mr. C. R. Klinck, B.S.A., and Mr. A. W. Mason, B.S.A., have devoted nearly the whole of their time to the work in Plant Breeding, which is now being developed to such a large extent, and from which we hope to obtain results of much importance. Miss J. I. Coxon has been not only accurate and painstaking in her duties as stenographer, but has always been very obliging and deeply interested in her work.

OUTLINE OF THE EXPERIMENTAL WORK IN FIELD HUSBANDRY.

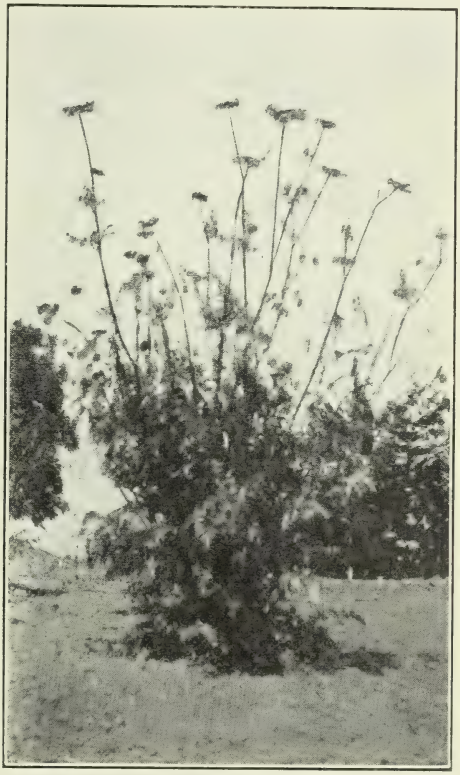
About fifty acres of land, divided into upwards of 2,000 plots, are used for experiments conducted with varieties of grain, root, tuber, grass, clover, fodder, silage, and other crops; with artificial, green and barnyard manures; with methods of cultivation, selection of seed, dates of seeding, etc. All of these experiments are conducted with the greatest care, and for several years in succession in order to secure strictly accurate results. These experiments deal with the crops grown on over nine-tenths of the cultivated land in Ontario.

The grounds have a gentle slope towards the southwest, and the soil is an average clay loam. About one-quarter of the land is manured each year with twenty tons of farmyard manure per acre; thus most of the land receives an application of farmyard manure once every four years. No commercial fertilizers are used except in distinct fertilizer experiments, and these occupy only a small number of plots each year. Within the past twelve years one green crop has been plowed under on each section of the field. The plots vary in size according to the requirements of the different experiments, and the yields per acre are determined from the actual yields of the plots in every instance.

The work in the Experimental department consists in planning the various experiments; laying out, seeding, and looking after the field plots; harvesting, threshing, weighing and testing the grain; taking up, weighing, counting, testing and storing the potatoes and roots; cutting, weighing and harvesting the grass, corn and fodder crops, etc., and also in picking by hand the samples of grain grown on the plots, some to be sown on the plots the following year and some to be distributed for co-operative experimental work throughout Ontario. A great deal of thought and care is required in planning, supervising and examining these plots, and in studying, comparing and summarizing the results for presentation in reports, bulletins, newspaper articles, and lectures.



A plant of mangel seed.



A carrot plant producing seed.

RESULTS OF EXPERIMENTS.

All of our field experiments are conducted for at least five years before conclusions are drawn, and many of them are continued for a much longer period of time. For the results of some of the tests which were carried on for five or more years previous to 1909, the reader is referred to former reports. The results of some of the experiments which have as yet been conducted for only one or two years, are held over until the tests can be carried through for at least another summer. As different seasons vary so much in temperature, rainfall, etc., the average results of experiments continued for several years are of much greater value than those secured from only one or two years' work. Owing to the great care exercised in the work and the number of years through which the experiments are continued, we are able to present the results with much confidence in their reliability and in their practical value. From year to year the reports of the experimental work are being more widely read and more carefully studied by the farmers of the Province, and this is leading to a greater interest in crop production and a deeper knowledge of plant life on the farms of our country.

WEATHER CONDITIONS IN 1909.

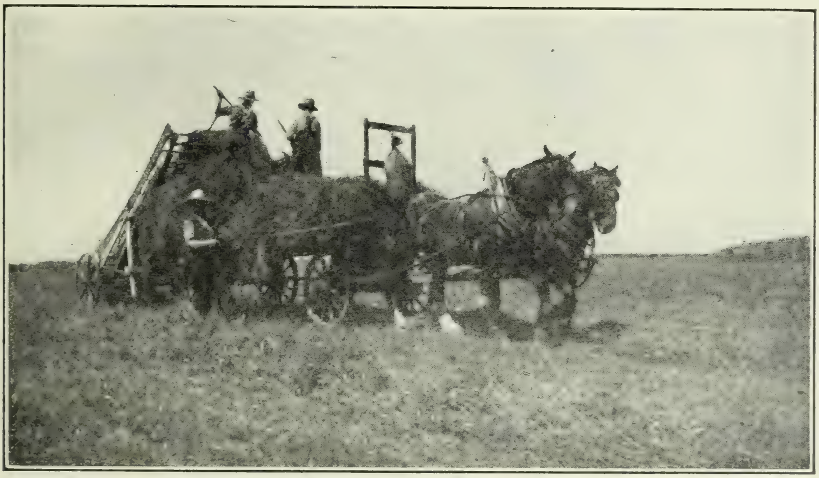
In order to better understand the results of experiments with field crops conducted at the College, it is important to have a knowledge of the weather conditions of the different seasons during which the experiments have been conducted. In each of the past ten years, careful records of the rainfall have been kept in connection with the Physical department of the College. The following table gives the total amount of precipitation in each of the six months of the growing season in each of the past ten years, as recorded at the College.

Month.	Amount of Precipitation During the Six Growing Months.										
	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	Average 10 years.
April	1.69	2.24	2.43	2.69	2.10	1.82	1.44	1.66	1.33	3.60	2.10
May	1.03	3.26	1.67	2.44	3.01	3.89	2.71	2.64	3.47	3.43	2.76
June	4.47	1.53	3.06	3.05	2.86	3.24	4.06	1.11	3.21	1.33	2.79
July	3.05	4.07	6.43	2.67	4.99	4.60	4.65	1.92	3.25	4.54	4.02
August	.87	3.51	2.18	3.47	3.88	1.98	2.13	.62	2.75	89	2.23
September	1.52	2.45	3.58	1.48	2.80	2.85	2.49	2.87	.73	.86	2.16
Total	12.63	17.06	19.35	15.80	19.64	18.38	17.48	10.82	14.74	14.65	16.06

From the table here presented, it will be seen that the amount of rainfall in April of the present year was 3.6 inches, which was considerably greater than that in any April in at least nine years previous. Owing to this large amount of rainfall in the month of April and the unusually cool weather, the seeding was greatly retarded, the land in the experimental plots being unfit for cultivation until nearly the end of the month. The unusually cold, wet, backward season was apparently general throughout the Province of Ontario, and therefore the conditions at Guelph would be quite representative for Ontario for the present year. In the month of May there was also about two-thirds of an inch of rainfall more than the average for the same month during the ten year period. The amount of rainfall for the month of June was unusually light and that for July unusually heavy. The rainfall in August and in September was very small indeed, there being less than an inch in either of these two months. The total precipitation for the six months was 14.65 inches. This was about an inch and a half less than that for the average of the ten year period. It will therefore be seen that the weather conditions of the past summer have been somewhat unusual. In spite, however, of the cold, wet spring, and the small amount of rainfall in August and September, the yields from the farm crops were, in most cases, fairly good. The experiments with farm crops during the past year will be specially interesting in showing results obtained in a season somewhat out of the ordinary and in a comparison of these results with the average of those for a series of years.

FARM CROPS IN ONTARIO.

If it is true that the output of the Ontario farms has practically doubled within the last fifteen or sixteen years, there are causes for this tremendous increase. Is this great increase owing to the improvement in the climatic conditions of Ontario, or is it largely due to the introduction of better methods of farming and of better varieties of farm crops? The work of the Ontario Agricultural College is more closely associated with this increase in agricultural production in Ontario than many people realize.



Loading Alfalfa in a thirty-acre field on the College farm.

The most extensively grown variety of barley and the second most extensively grown variety of oats in Ontario during the past few years were imported, tested and distributed by the Ontario Agricultural College. The variety of winter wheat which is now grown more extensively than any other variety of winter wheat in Ontario, was practically unknown to the Province until it was tested here and distributed through the medium of the Experimental Union. The average annual increase in yield of grain per acre for the whole of Ontario during the last twelve years, as compared with the twelve years previous, has been 11.3 per cent. in winter wheat, 15.1 per cent. in oats, and 22.7 per cent. in barley. The increase for the oats alone amounts, on the average, to $11,029,258 annually. In the last twelve years, the market value of the barley of Ontario has increased from $3,245,880 to $10,943,788. During the last five years, the market value of the barley grown in Ontario was greater than that from the years 1885 to 1889, which was at the time that barley was grown extensively and shipped to the United States, and previous to the high tariff which stopped the export of the barley from Ontario to the American Union. It is exceedingly gratifying to realize that the average yield per acre of some of the principal farm crops is now increasing from year to year. There are yet exceptionally fine opportunities and almost unlimited possibilities for the agriculture of Ontario.

Any person who makes a study of our agriculture and its possibilities, cannot help but realize that the young men of our Province have plenty of room for their best thoughts and their deepest study in their endeavors to become good farmers in the highest sense of the term. The fertility and the cultivation of the soil, the ripening and the storing of the crops, the selection and the preservation of the seed, the feeding and the care of the farm stock, the breeding of the plants and the animals, and many other problems of great value and intense interest, require not only a practical training in the operations of the farm, but also a good knowledge of the underlying principles of agriculture, and exceedingly good judgment in the application of those principles to the various operations on the farm. Even the most common plants and animals and the most humble operations on the farm are worthy of the best thoughts of the best men. In order to know which are the most valuable classes of crops to grow to meet the various requirements, the most desirable varieties of each class to furnish the largest amount of food of the best quality, the most suitable time and method to sow each variety to use advantageously the fertility and the moisture in the soil, etc., are all questions of the utmost importance for every farmer to determine for himself. In this work, however, the department of Field Husbandry at the College is in a position to give a large amount of valuable assistance.

It will be perceived that slight mistakes in the selection of the most suitable crops for growing in various localities, while they may not prove disastrous, may easily result in considerable loss to the individual farmer. Careful thought should be given to this phase of the question of crop production. The selection of crops is necessarily governed to a considerable extent by the location of the farm, the quality of the soil, the particular kind of farming which is followed, etc. It is therefore to the interest of every individual farmer to study these things out for himself when determining the kinds of crops which are likely to give the best satisfaction under his own particular circumstances.

A field of the O. A. C. Number 21 Barley on the College farm.

As a general rule, farmers know that oats will yield more bushels per acre than barley, and that barley, in turn, is likely to yield more bushels per acre than wheat, but a bushel is a bulk measure and not a weight measure, and the weight of grain produced per acre is of much greater importance than bulk. It is both interesting and instructive to compare the results of the various crops grown in Ontario under similar standards of measurement. The following table, which has been compiled from the reports of the Bureau of Industries, gives the average yields for twenty-seven years in both bushels and pounds per acre of the grain crops, and of bushels and tons per acre of the root crops, as grown on the farms throughout Ontario.

———	Yield per acre.	Yield per acre.
GRAIN :—	Bus.	Lbs.
Barley	27.7	1330
Winter Wheat	20.7	1242
Oats	35.7	1214
Peas	19.4	1164
Beans	17.1	1026
Spring Wheat	15.9	954
Buckwheat	19.8	950
Rye	16.4	918
FIELD ROOTS :—		Tons.
*Mangels	460.0	13.80
Turnips	429.0	12.87
*Carrots	346.0	10 38

*Average for twenty-six instead of for twenty-seven years.

A field of the O. A. C. Number 21 Barley on the College farm.

It will be observed that for the whole Province of Ontario and for a period of twenty-seven years, the annual yield of barley per acre has surpassed that of winter wheat by 88 pounds and of oats by 116 pounds. It will also be observed that the mangels surpassed the turnips in average yield per acre by 31 bushels or almost 1 ton.

At the College, particular attention has been given to a study of the different classes of farm crops by making use of a leading variety in each class. One of these experiments was started in 1902 and was conducted in duplicate each season for six years in succession. In each of the six years, twelve varieties of farm crops were grown in duplicate, making in all twenty-four plots in the experiment each season. In the spring of 1907, another experiment made up of eight different classes of farm crops was conducted in duplicate, and therefore occupied sixteen plots. This experiment was repeated in the same way in 1908 and again in 1909. The following table gives the average results of the twelve tests made during the six years, and of the six tests made during the three years in date of ripening, length of plants, percentage of rust, percentage of crop lodged, and of yield in tons of straw and in pounds of grain per acre:

Varieties.	Date of Ripening.	Length of Plants.	Percentage of Rust.	Percentage Lodged.	Straw per Acre.	Grain per Acre.
Average results for 6 years, 1902-7.		Ins.			Tons.	Lbs.
Emmer (Common)	Aug. 17 ..	39	4	36	2.2	2,756
Barley (Mandscheuri)	" 4 ..	40	5	39	1.9	2.715
Oats (Joanette)	" 14 ..	38	7	41	2.7	2,559
Hulless Barley (Black)	" 4 ..	31	8	40	2.0	2,527
Early Oats (Wild Goose)	" 7 ..	41	10	53	2.1	2,395
Hulless Barley (White)	" 7 ..	33	6	59	1.9	1,992
Spring Wheat (Alaska)	" 24 ..	47	9	16	2.4	1,905
Spring Rye (Common)	" 14 ..	53	4	21	2.1	1,780
Field Peas (Early Britain)	" 21 .	44	......	....	1.7	1,772
Flax (Common)	" 15 ..	28	......	14	2.0	1,100
Grass Peas (Common)	Sept. 8 .	50	......	....	2.2	753
Vetches (Common)	" 2 ..	34	......	....	1.6	595
Average results for 3 years, 1907-9.						
Emmer (Common)	Aug. 15 .	36	2	12	1.8	2,696
Oats (Banner)	" 17 ..	44	6	21	1.9	2,606
Barley (Mandscheuri)	" 5 ..	32	2	5	1.5	2,591
Hulless Barley (Guy Mayle)	" 3 ..	23	5	15	1 4	2,344
Spring Wheat (Wild Goose)	" 23 ..	43	4	1	2.2	2,154
Field Peas (Early Britain)	" 18 ..	36	......	....	1.3	2,145
Spring Wheat (Red Fife)	" 22 ..	40	5	11	1.8	1,795
Spring Rye (Dakota Mammoth)	" 13 ..	51	3	5	1.8	1,674

In the average results of the one experiment for six years, as well as in the average results of the other experiment for three years, it will be seen that Emmer gave the largest yield of grain per acre, in the former experiment, the yield being 2,756 pounds and in the latter 2,696 pounds. A slight change has taken place between the relative positions of the barley and oats in the two different experiments; in the former the Mandscheuri barley surpassed the Joanette oats by 156 pounds of grain per acre, while in the latter the Banner variety of oats surpassed the Mandscheuri barley by an average of 15 pounds of grain per acre. It must be remembered that the latter experiment is just under way and will be continued for two or three years before it is really completed. Although in this experiment the Banner oats gave 15 pounds of grain per acre more than the Mandscheuri barley, it should be noted that the Banner oats has, on the average, about 32 per cent. of hull and the Mandscheuri barley about 15 per cent. of hull. The Hulless barley occupies fourth place in each experiment. A comparison between the results of the farm crops as grown throughout Ontario and those grown at the Agricultural College, forms a study of much interest and provides data of considerable importance. The fact that Emmer has taken the lead in the production of grain in the average results of both the experiments at the College speaks well for this new introduction into Ontario. For fuller information and more detailed results regarding the Emmer and other classes of farm crops mentioned in the accompanying table, the reader is referred to experiments enumerated throughout this report.

CO-OPERATIVE EXPERIMENTS WITH FARM CROPS THROUGHOUT ONTARIO.

Our system of co-operative experiments throughout Ontario has been an exceedingly important feature of the College extension work for nearly a quarter of a century. The work is carried on through the medium of the Ontario Agricultural and Experimental Union. It is exactly twenty-four years since the present system was started in a small way. From the beginning it has gradually increased in extent and in influence throughout the Province. We have now hundreds of men throughout Ontario who have successfully conducted experiments on their own farms for five years or more, and some of them have conducted successful work from twelve to fourteen years.

Sowing some of the experimental plots.

In 1909, co-operative work was conducted on farms throughout Ontario in Agriculture, Horticulture, Forestry and Poultry Raising, and in connection with the public schools in Elementary Agriculture, Horticulture and Forestry. Although some work in connection with the schools had been conducted in previous years, it was not until 1909 that this branch of the work was placed under a separate committee. We are pleased to state that the work in connection with the schools has been largely increased this year, and we believe that there are excellent opportunities for great development along this line.

The co-operative work in Agriculture has been conducted for a longer time than that of any other department. The number of co-operative experiments for the twenty-four years from 1886 to 1909 inclusive, is 54,345. In agriculture alone, definite experimental work was conducted on measured plots on no less than 4,856 farms in 1909. There are now no less than thirty-eight separate experiments which cover all the most important farm crops in the Province of Ontario and which deal with varieties of crops, mixtures of grains and grasses, application of commercial fertilizers, and different methods of cultivating the soil.

The experimenters deserve great credit for the work they are doing, and we believe that that work is being appreciated by the farmers generally, as being a movement which is largely concerned in the upbuilding of progressive agriculture in Ontario. As many of the experimenters combine the practical experience obtained on the farm with the educational training secured at the Agricultural College as well as the special training furnished by successfully conducting co-operative work on their own farms for several years in succession, the reports are becoming very valuable indeed. It is recognized by all who understand the work which is being carried on that the Experimental Union has now a very valuable corps of exexperimenters. Although the Experimental Union, through its system of co-operative experiments has been doing very excellent work in the past, we believe that greater results await it in the future and that it will continue to exert an increasing influence for the betterment of agriculture in Ontario.

Planting the nursery plot for work in plant improvement.

THE INFLUENCE OF VARIETY ON CROP PRODUCTION.

After carefully watching the crop production of the Province of Ontario and closely observing the experimental work at the Ontario Agricultural College for the last twenty-four years, where we have carefully tested each of 2,000 varieties of farm crops for at least five years, the writer is thoroughly convinced that the selection of proper varieties is a question of great importance from the standpoint of the practical farmer or the scientist who is carrying on systematic work in plant breeding. Some varieties are particularly desirable, owing to the fact that they usually produce very heavy yields per acre, while others are desirable, owing to the fact that they are exceptionally early in maturing. Some varieties of grain produce long straw, while other varieties produce straw which is very short in its growth. Certain varieties seem very susceptible to the attacks of smut or rust, while other varieties are almost immune. There are also great variations in the quality of the grain, in the strength of the straw and in many other respects.

We have a Province well suited for the cultivation of a great variety of farm crops. The conditions of soil and climate are particularly suitable for the cultivation of a number of the different classes of grain, root, fodder, hay and pasture crops. While it is of great importance for the individual farmers to study the various classes of crops to meet their own particular conditions and circumstances, it is also exceedingly important that they study with great care the leading varieties of each class with the object of securing those particular varieties most suitable for them to cultivate. Although reports will be presented later to show many distinguishing results of a number of the leading varieties of farm crops, a concise statement is here presented to show the comparative yields of a few of the leading classes and of a few prominent varieties of each class which have been grown in the department of Field Husbandry at the College in periods of from thirteen to twenty years without change of seed from one farm to another.

Classes.	Varieties.	Average yield per acre.	
		Lbs.	Bushels.
Oats (20 years)	Siberian	2,982	87.7
	Joanette	2,972	87.4
	Egyptian	2,564	75.4
	Black Tartarian	2,431	71.5
Barley (20 years)	Mandscheuri	3,451	71.9
	Oderbrucker	3,125	65.1
	Mensury	2,899	60.4
	New Zealand Chevalier	2,731	56.9
Winter Wheat (14 years)	Dawson's Golden Chaff	3,288	54.8
	Imperial Amber	2,976	49.6
	Turkey Red	2,682	44.7
	Treadwell	2,676	44.6
Spring Wheat (Flour) (20 years)	Saxonka	1,878	31.3
	Red Fife	1,872	31.2
	Colorado	1,686	28.1
Spring Wheat (Durum or Macaroni) (17 years)	Wild Goose	2,892	38.2
	Medeah	2,046	34.1
	Ontario	1,410	23.5
		Tons	
Potatoes (20 years)	Empire State	6.7	221.7
	Rural New Yorker No. 2	6.0	200.9
	White Elephant	6.0	200.6
	Stray Beauty	4.8	160.1

It is important to note that, although the different varieties of oats, barley, wheat and potatoes have been grown in the Experimental department at the College for from fourteen to twenty years in succession, the average yield per acre for the last few years is even greater than the average yield per acre for the first few years of the whole period, in the case of practically all of the varieties under experiment. As there was no change of seed from one farm to another during the entire periods, it shows that it is quite possible to grow these crops for a considerable length of time without the introduction of fresh seed from other localities, providing proper care is exercised each year in the quality of the seed used. Far more depends upon the seed which is sown than some people seem to realize.

Although no varieties are presented in the accompanying table except prominent new kinds or old standard varieties, it will nevertheless be seen that there is a considerable difference in the average yields per acre of the varieties here reported. The Siberian oats surpasses the old Black Tartarian variety, which is well known in Ontario, by 16.2 bushels per acre per annum. The Mandscheuri variety of barley surpasses one of the best two-rowed varieties by an average of 15 bushels per acre per annum. The Dawson's Golden Chaff winter wheat gave an average yield per acre annually of fully 10 bushels more than the Treadwell variety, which at one time was a favorite wheat in Ontario.

This table again brings out the fact that in a series of years, barley has again surpassed oats in yield of grain per acre when the results are presented in pounds instead of bushels. These results show the same order of yield per acre for the different classes of grain as those for similar classes over the Province of Ontario for twenty-seven years; viz., that the greatest number of pounds per acre were produced by the barley, second largest by winter wheat, and third largest by oats.

IMPROVEMENT OF FARM CROPS.

The work in plant breeding has received a good deal of attention at the Ontario Agricultural College. Hon. W. M. Hays, Assistant Secretary of Agriculture for the United States, who has done a good deal of work and has for many years taken a very deep interest in plant breeding in the United States, informed the writer this summer that the system and the extent of the work of plant breeding at our College he considered to be one of the two best in America at the present time. The only other institution which approximated the work here was the Agricultural College at Minnesota, and while their work in plant breeding at that Institution was probably as extensive as that at Guelph, it was not as thorough in some of the details. The work in plant breeding with farm crops at Guelph has included the thorough testing of over 2,000 varieties, for several years in succession, in order to make a careful study of the comparative characteristics and the productiveness of the various kinds. With these carefully conducted experiments with the different varieties as a foundation, the work in plant breeding has included a few of the best varieties through the establishment of new strains and the formation of new hybrids from the artificial cross-fertilization of some of the very best of the named varieties.

Ten steers pasturing on eight acres of annual pasture of oats, 51 lbs.; Early Amber Sugar Cane, 30 lbs.; and common Red Clover seed, 7 lbs.; or a total of 88 lbs. per acre.

SELECTION. For several years past, work has been conducted in the improvement of some of the varieties of farm crops through pure selection. Some of these selections of individual plants have been made in the open field, but the most of them in the nursery plot in the experimental grounds, where thousands of seeds of each of a few varieties have been planted by hand, and the most promising plants of these have been selected as the mother plants of new strains. Seeds from the individual plants, whether taken from the open field or the nursery plot, have been planted by hand in rows and the resulting crops have been carefully noted. Seed from the most promising rows would be carefully saved and part of it would be sown the following year in rows and part of it in very small plots, usually 1-400 of an acre in size. Grain from the rows and the very small plots would be used for seed in the following year for rows, plots of 1-400 and 1-160 of an acre in size. The most promising strains would again be selected and the seed sown in the following year in a similar way and also on the larger plots in comparison with the varieties in the regular experiments. In accordance with this plan, there were 418 row plots, 10 1-400 acre plots, 69 1-160 acre plots, and 63 regular plots uniform with those used in the variety work. As some of these strains have now been grown in comparison with the standard varieties for two, three and four years, we here present the results of the leading selected strains in comparison with the original variety in each of a number of different varieties and classes of farm crops.

Class of Crop.	Variety.	Number of Years.	Yield of Grain per acre.	
			Standard Variety.	Selected Strain from Standard Variety.
			Bus.	Bus.
White Oats	Siberian	3	83.0	88.7
Black Oats	Joanette	4	75.9	88.5
Early Oats	Daubeney	3	89.4	93.5
Early Oats	Early Ripe	3	73 5	82.8
Six-rowed Barley	Mandscheuri	4	80 6	80.9
Two-rowed Barley	French Chevalier	4	48.4	50.5
Hulless Barley	Guy Mayle	4	41.0	42.9
Winter Wheat	Dawson's Golden Chaff	4	48.6	55.6
Winter Wheat	Bulgarian	4	37.2	37.7
Winter Wheat	Imperial Amber	4	37.7	37.6
Spring Wheat	Red Fife	3	34.8	35.6
Durum Wheat	Wild Goose	3	31.2	29.5
Durum Wheat	Medeah	3	28.1	28.7
Spring Rye	Saatroggen	4	29.4	33.4
Millet	Siberian	3	39.5	45.1
Field Beans	New Prize Winner	2	19.2	23.8

The results here tabulated show that in nearly all cases the selected strains have given comparatively higher yields per acre than the varieties. In some cases this increase is quite marked and especially is this true in the case of the Joanette oats, Early Ripe oats, Dawson's Golden Chaff winter wheat and Siberian millet. While there are these differences in yield per acre, it must be remembered that productiveness has not been the only characteristic which has been considered in the selection. Weight per measured bushel, strength of straw, freedom from rust, etc., have all received careful attention. The thinness of hull of the oats, and the quality of the grain of wheat have been important factors in the selection of the improved strains.

It is the intention of the Department to do even more in the future to improve varieties through systematic selection than has been done in the past. We believe that there is room for very excellent work along this line. Although we have already selected some strains which we believe are improvements on some of the best of the standard varieties, we believe that we can do greater work along this line in the future than has been accomplished in the past. The work of Dr. Nilsson, Svalof, in the selection of individual plants as the foundation of new strains has been very marked and the account of his work is exceedingly interesting. I would recommend anyone specially interested in this line of work to secure the book entitled "Plant Breeding," written by Hugo DeVries and printed in 1907 by the Open Court Publishing Co., Chicago.

CROSS FERTILIZATION. Even though we may secure, through experimental work, the best varieties of farm crops and start new strains through selection, it seems very difficult to obtain improved strains of the best varieties which will possess in themselves combinations of all the desirable characteristics. In order to assist in securing these desirable combinations, cross fertilizations are made between varieties with the object of obtaining an occasional hybrid which will combine the good qualities and will eliminate the undesirable features of the parents. In order to illustrate this point, permit me to quote our experience with barley. We have found in our experiments at Guelph that a mixture of oats and barley sown together in different proportions will give a heavier yield of grain per acre than either oats or barley grown alone. As all of the best six-rowed barleys which we have been able to secure are considerably earlier in maturing than most of the best yielding varieties of oats, it has been necessary either to secure a late maturing two-rowed barley to mix with the most popular oats of Ontario, or to secure a very early maturing variety of oats, such as the Daubeney, to mix with the popular varieties of six-rowed barley. It seems indeed difficult to secure a high-yielding six-rowed barley which is sufficiently late in maturing that it can be mixed, for instance, with the Banner or the Siberian oats and ripen at the same time as either of these varieties. It is also very difficult to secure a strain of six-rowed barley by selection which will meet these conditions. We have therefore been endeavoring, through cross fertilization of the Mandscheuri six-rowed barley and a late two-rowed variety, such as the Chevalier, to secure a hybrid six-rowed barley with stiff straw and the power of producing high yields of grain of good quality, and at the same time being a barley which will mature about the same time as the Chevalier variety of barley or as the Banner or Siberian varieties of oats. It might here be stated that the results are very encouraging, and we now have a hybrid barley which seems to fill these requirements better than any variety or any strain which we have been able to secure from any source through the introduction or the selection of plants. This new hybrid is yet only grown in small quantities and will probably not be ready for distribution for about two years. All of our work in hybridization with the various kinds of farm crops is carried on with definite objects in view, as illustrated by the one case just referred to. We believe that the reader will see the value and the importance of this line of work, but he must remember that it is a department of investigation which has been developed with farm crops to only a very limited extent in any part of the world.

It therefore takes a considerable amount of time and of patience to accomplish desirable results in this field of operation, the underlying principles of which have been so little known.

Work in hybridization was started at the Ontario Agricultural College in 1902 and has been continued each year since that time. Some of our principal farm crops, such as wheat, oats, barley and peas are naturally self fertilized. If we artificially cross fertilize the varieties of any of these classes of grain, we break up the characteristics of the individual varieties and get a great many different combinations. By careful study and selection, new varieties can be obtained which come true to type and which are different from either of the parents. As this work deals with the very principles of heredity, it requires a deep study on the part of those engaged in the work, and it also furnishes some most valuable information in giving us a greater and a better knowledge of the principles of heredity as it affects life in its various forms.

It was my privilege to visit Luther Burbank in California in 1906. Mr. Burbank has certainly done much to lead the way in the line of plant breeding. He has, however, worked almost entirely with plants which are increased by vegetative propagation, and consequently he does not require to plant the seeds of his hybrids. In obtaining his ideal plants he can easily reproduce the same by means of runners, cuttings, scions, buds, tubers or bulbs, as the case may be. In breeding many of our cereals, however, we cannot increase our plants in this way but are required to secure the seed and to continue the selection of the individual plants until they become perfectly fixed in all characteristics.

In 1909, we grew separately about 100,000 hybrid plants at our College, resulting from twenty-five distinct crosses made within the past seven years between leading varieties of winter wheat, spring wheat, oats, barley and peas. Besides the individual plants here referred to, we had in our experimental grounds 198 plots of hybrids of the following sizes: 31, each 1-100; 49, each 1-160; 106, each 1-400; and 12, each 1-1000 part of an acre. A great deal could be said regarding the methods used and the progress of the work, but we prefer at present to content ourselves with these simple statements. We hope before very long to show to the Province of Ontario that we have been able to originate, through cross fertilization, new varieties of farm crops which are of very great value indeed to the farmers of the Province. Some of our thinnest hulled and best yielding oats and some of our most promising barleys during the last couple of years are amongst the hybrids which we have originated, but these hybrids have not yet been grown for a sufficient length of time to enable us to be absolutely sure that they will come perfectly true to type in all characteristics.

THE YIELDS OF PLANTS AS INFLUENCED BY THE SIZE OF THE SEEDS USED.

A very large amount of work in seed selection has been conducted at Guelph, and besides being reported from time to time in the annual reports of the College, the results were presented in a summary form in Part I. of the Annual Report of the Farmers' Institutes for the Province of Ontario for 1907, and in an abbreviated form in the College Report for 1908.

The average results of these experiments go to show that where equal numbers of large plump and small plump seeds of barley, spring wheat, winter wheat, oats, and field peas were used in comparison, but in every instance the larger seed produced the larger yield of grain. In no case did the smaller seed produce a greater yield of straw or a greater weight of grain per measured bushel than the seed of a larger size, but in three instances the results were similar. These experiments with each class of grain were repeated from five to eight or nine years. It seems very evident indeed from the work conducted at Guelph that a large grain will produce a larger, a more vigorous, and a more productive plant than a small grain of the same variety and of equal soundness and vitality.

THE VALUE OF SPROUTED WHEAT FOR SEED PURPOSES.

As the result of quite extensive experiments conducted in each of two years in which the harvest seasons were very wet, it was found that the sprouting of winter wheat in the field before it was harvested injured the seed grain a great deal for seed purposes. When the grains were badly sprouted, not only did fully four-fifths of them decay in the ground, but even those which did grow produced plants which were very uneven in growth. Even a very slight sprouting in the field checked the vitality of the seed grain considerably and in a portion of the grain completely killed the sprouts.

SHRUNKEN, BROKEN, AND IMMATURE SEED OF WINTER WHEAT.

Twelve separate tests made at the College furnish interesting results in showing an average increase in yield of grain per acre of 6.8 bushels from large as compared with small seed, of 7.8 bushels from plump as compared with shrunken seed, and of 35.6 bushels from sound as compared with broken seed.

Seed which was allowed to become thoroughly ripened before it was cut, produced a greater yield of both grain and straw and a heavier weight of grain per measured bushel than that produced from wheat which was cut at any one of four earlier stages of maturity.

SHRUNKEN AND BROKEN SEED OF SPRING GRAINS.

The results of experiments which were conducted for a period of six years show that on the average there was an increase in yield of grain per acre of 7.8 bushels from plump as compared with shrunken barley, and of 5 bushels from plump as compared with shrunken spring wheat. In comparing sound grain with that which had been broken by the separator in threshing, the average yield obtained from the former surpassed that obtained from the latter by 10.6 bushels per acre in the experiments with barley for six years and of 19 bushels per acre in the average of the experiments with peas for nine years. In these experiments, equal numbers of whole seeds and double the number of broken or half seeds were used. In all cases, the seeds were counted with care and accuracy and were sown in plots twenty-five links square.

TREATMENT OF GRAIN FOR SMUT.

In each of five years, some of the most highly recommended treatments for the killing of the loose smut in oats and the stinking smut in wheat were used, and very careful determinations were made to ascertain the comparative influence of the different treatments. Those treatments which have been the most effectual in destroying the loose smut in the oats and the stinking smut in the wheat were as follows:

(1) IMMERSION IN DILUTED FORMALIN. The solution of formalin used for the immersion process was made by pouring one pint of the formalin into 42 gallons of water, and the seed oats were immersed in the solution for twenty minutes.

(2) SPRINKLING WITH DILUTED FORMALIN. One-half pint of formalin was poured into five gallons of water. The oats were then sprinkled with this solution and carefully stirred until the grain was thoroughly moistened.

(3) IMMERSION IN HOT WATER. For this treatment, the grain was placed in a bag, which was then immersed in water at about 115 degrees F. Soon afterwards it was placed in water which was kept at a temperature of between 130 degrees and 135 degrees F. The grain was occasionally stirred, and was allowed to remain in the water for a period of fifteen minutes. It was then spread out on a clean floor to dry, where it was stirred occasionally.

(4) IMMERSION IN BLUESTONE SOLUTION FOR TWELVE HOURS. In this treatment the bluestone solution was made by dissolving one pound of bluestone in 25 gallons of water, and the oats were immersed in this solution for a period of twelve hours.

The results of all the experiments show that the greatest yields of both winter wheat and oats per acre were produced from immersing seed in a solution made by adding one pint of formalin to 42 gallons of water, in which the grain was immersed for a period of twenty minutes. This treatment was easily applied, comparatively cheap, effectual in killing the smut spores, and also effectual in producing the largest average yield of both wheat and oats per acre of all the treatments used.

SUSCEPTIBILITY OF VARIETIES OF OATS TO ATTACKS OF SMUT.

The results under the previous heading show that oats can be effectually treated for the prevention of smut. Some of these treatments have been known for some years past. The difference in the susceptibility of different varieties of oats to the attacks of smut, however, has apparently received but little consideration. The writer, a few years ago, considered that if the smut spores were present and the weather and soil conditions were favorable, there was almost sure to be a development of smut on all kinds of oats, and that it mattered but little as to the variety. Recent investigations which we have made at Guelph, however, seem to show that there is a very marked difference in the different varieties of oats regarding their susceptibility to the attacks of smut. During the years 1902, 1903, 1904 and 1905, we did not treat our varieties of oats for smut, but carefully picked out all smutted heads each year and kept an accurate record of the amounts of smut produced in the different varieties. In the spring of 1906, however, the varieties were all carefully treated by immersing the seed for twenty minutes in a solution made from one pint of formalin and 42 gallons of water. Since that time, the same varieties have not been treated. The following table gives the number of smutted heads taken from a plot 10 links wide by 100 links long from each of six different varieties of oats in each of the past eight years, four of the years being immediately before and four immediately after the treatment.

The table here presented shows two very interesting features, viz., the marked differences in the different varieties in their apparent susceptibility to smut, and the effectuality of the treatment in destroying the smut which increases only slightly from year to year. When the oats are grown on a farm, however, and the threshing machine comes from one farm where the smut is very bad, it is almost sure to bring smut spores with it and thus to contaminate the oats on the next farm, even though the seed had been treated in the spring previous. In order to keep some of the varieties of oats comparatively free from smut, therefore, it is necessary to treat occasionally and to watch carefully that smut spores are not introduced in considerable quantities from one farm to another.

Variety.	Before Treatment.				After treatment.			
	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
Early Ripe	0	0	3	0	0	0	0	0
Joanette	20	9	10	18	0	2	12	1
Siberian	32	43	78	20	0	1	0	0
American Banner	116	303	317	22	0	3	2	4
Black Tartarian	332	608	369	62	0	3	12	15
Early Champion	634	380	1,244	166	0	11	9	5

It will also be seen that the amount of smut varies considerably in different seasons, for instance, there was considerably more smut in nearly all varieties in 1904 than there was in 1905.

It will also be noticed that at least one variety of oats, viz., the Early Ripe, appears to be practically immune from the attacks of smut. This is the earliest oat amongst some two hundred and fifty varieties which we have grown in the experimental grounds. The grain, however, is long and slender, giving a light weight per measured bushel. While it is true that there were three smut heads found in the Early Ripe variety in 1904, it is quite probable that this variety was entirely immune when we consider that fully 17,000 grains of oats were sown in each plot, and that it would be a very easy matter for one seed of another variety of oats, which is not immune to smut, to grow as an impurity in the plot and to furnish three smutted heads. A seed might easily be introduced by means of manure or in some other way. Taking advantage of the early maturity and the apparent immunity to the attacks of smut, we have used the Early Ripe variety to cross with the American Banner with the hope of securing a hybrid which will be early in maturing, immune to the attacks of smut, and at the same time will produce a large yield of grain of good quality. A large number of hybrids have been produced in 1909, and these plants have been carefully noted and have been stored for a more thorough examination during the winter season.

Different Quantities of Flax Seed per Acre.

In each of five years, four varieties of flax have been sown at the rate of one peck, two pecks, three pecks, eight pecks, twelve pecks, and sixteen pecks per acre, making in all twenty-four lots in the experiment each year. The following table gives the average results of the experiments for the past five years.

It will be seen that the longest straw was produced when less than one bushel of seed was used. It will be noticed, however, that the greatest yield of straw was produced when two bushels or more of seed were used per acre. These results might be interesting in the study of the length and the amount of fibre produced

It should be remembered that the thin seeding encourages a considerable amount of branching of the stems, while the thick seeding produces straight stems with but little branching.

Amount of Seed Sown.	Straw or Fibre Producing Material.		Weight per measured bushel.	Yield of grain per acre.	Yield of grain per acre, less amount of seed sown.
	Height of crop.	Yield of straw.			
	inches.	tons.	pounds.	bushels.	bushels.
1 Peck per acre.	29	1.55	54.9	14.9	14.6
2 " "	29	1.68	54.7	15.2	14.7
3 " "	29	1.96	54.8	18.6	17.8
8 " "	28	2.24	54.6	19.9	17.9
12 " "	27	2.35	54.3	20.2	17.2
16 " "	26	2.24	54.2	18.0	14.0

In the average yield of seed per acre, it will be seen that where twelve pecks of seed were sown, slightly over twenty bushels of seed were obtained. When the amount of seed used, however, is subtracted from the amount of seed produced, the greatest yield has resulted from eight pecks per acre, which is only slightly more than that obtained from three pecks per acre. There was a marked difference in the yield of seed from the different varieties used in this experiment as will be seen under the discussion of the varieties of flax in another part of this report.

THE STOOLING OF CEREALS AS A FACTOR IN DETERMINING THE AMOUNT OF SEED PER ACRE.

Strange though it may seem, there appears to be but very little definite information regarding the stooling or the tillering of cereals as a factor in determining the amount of seed which is required per acre, in order to give the best results. While it is true that the stooling of the cereal plants is influenced by the fertility of the soil, the conditions of the weather, etc., it is also true that it is influenced by the variety of grain and by the thickness of the sowing. The fertility of the soil, the thickness of the sowing, and the varieties used are largely under the control of the farmer. Therefore, the stooling or the tillering of the grain crops forms an exceedingly important subject for study and investigation.

Although but little has been done in this investigation in America, we should mention that a certain amount of study was given to this subject at the Wyoming Experiment Station, and the results were published in a bulletin issued in 1898, The general conclusion from the experiments conducted in Wyoming is stated as follows:

"The study of our experiment seems to indicate that in farm practice, sowing seeds so plants will be secured about one inch apart in the drills, will produce the largest yields per acre of wheat or barley, but that oats should probably be planted a little thicker than this."

This conclusion, however, apparently ignores the fact that there is a marked difference in the stooling powers of different varieties of oats and barley and of wheat. Outside of the work conducted at Wyoming, I can find but little trace of any valuable experiments along this line in America. In order to ascertain whether such work has been carried out and the results published, other than I had been able to find, I wrote to Mr. J. I. Schulte, who is the editor on "Field Crops," of the Experiment Station Record, in connection with the Department of Agriculture at Washington. From Mr. Schulte's reply to my inquiry, I make the following quotation:

"I do not recall any important work published recently on the tillering of grains. One or two Germans have reported observations on correlation in some of the small grains in which the stooling power was taken into consideration. This is a very important subject and one which, as you suggest, has not received the attention it merits."

Although some work has been done at our College previous to the past year in ascertaining the stooling powers of the varieties of cereals under experiment, more extensive work was started in 1909 than ever before. The work for the present year was confined almost entirely to oats and included the following investigations:

(1) Planting by hand sixty-eight seeds in rows a foot apart and with seeds a link apart in the row of each of eighty varieties of oats.

(2) Both large and small seeds planted in plots by hand, one, two, three, four, six, eight, and twelve inches apart both ways, with each of five different kinds of oats, thus making seventy plots in all.

(3) Seed oats planted by hand in rows eight inches apart, with the seeds one-half inch, one inch, one and one-half inches, two inches, three inches, four inches, six inches, and eight inches apart in the rows with each of five different varieties, making in all thirty-five plots.

(4) Sowing with the grain drill and broadcast by hand each of four kinds of oats at the rate of two bushels and four bushels per acre, making a total of sixteen plots.

THE STOOLING POWERS OF DIFFERENT VARIETIES OF OATS. As the result of the investigations in 1909, the varieties of oats showed very marked differences in stooling properties. In order to illustrate this point more clearly, we here enumerate a few varieties which show marked variations in this respect:

Varieties.	Average Number of Stools per Plant.	Varieties.	Average Number of Stools per Plant.
Burt	22	Sixty Day	17
Joanette	21	Siberian	14
Early Ripe	19	Abundance	11
Yellow Kherson	19	Storm King	8
Daubeney	18	Tartar King	8
American Banner	17	Early White Jewel	6

THE INFLUENCES FROM PLANTING OATS AT DIFFERENT DISTANCES APART. Many important results were obtained from experiments indicated above, under numbers 2 and 3. As only one year's work, however, has as yet been accomplished, it was thought wise to withold the detailed reports until further results could be obtained. It might be stated, however, that as the distance between the oat plants increased, there was also an increase in the number of the stools per plant, in the percentage of rust, in the lateness of maturity, and to a limited extent in the height of the crop, and there was a decrease in the yellowness of the plants in the dry weather in the summer.

INFLUENCE FROM SEEDING WITH DIFFERENT AMOUNTS OF OATS PER ACRE. An experiment was conducted in 1909 in plots measured off in one of the large fields of the farm proper, there being in all sixteen plots. Four varieties were used for the experiment. Each variety was sown at the rate of two bushels per acre and four bushels per acre, both with the grain drill and broadcast by hand. The oats used for this experiment were Joanette, the American Banner, the Regenerated Abundance (Imported Seed), the Regenerated Abundance (Ontario seed from crop produced from seed imported in 1907). The following table gives the result of the four kinds of grain sown at the rates of two bushels and four bushels per acre, each result being the average of the crop sown broadcast and with a grain drill.

Quantity of seed sown per acre.	Varieties.	Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.
Bushels.		Lbs.	Tons.	Bus.
2	Joanette	30.3	1.70	68.9
	Regenerated Abundance (imported seed)	26.9	1.22	51.7
	Banner	25 4	1.39	61.1
	Regenerated Abundance (Ontario seed)	28.2	1.35	61.3
4	Joanette	32.6	1.65	78.6
	Regenerated Abundance (imported seed)	30.6	1.29	60.7
	Banner	27.6	1 56	69.1
	Regenerated Abundance (Ontario seed)	30.5	1.34	58.3

It will be seen that this year slightly better results were obtained from four bushels than from two bushels per acre. It should be stated that, owing to the unusually late, wet season the oats were not sown until the 15th of May. The greatest yields were produced from the Joanette and from the Banner, when sown at the rate of four bushels per acre, and the lowest yields were obtained from Imported seed of the Regenerated Abundance, sown at the rate of two bushels and from Ontario seed of the Regenerated Abundance, sown at the rate of four bushels per acre. In averaging the four plots of each different class of grain, we obtained the summary results as follows:

Varieties.	Weight per Measured Bushel.	Straw per Acre.	Grain per Acre.
	Lbs.	Tons.	Bushels.
Joanette	31.5	1.68	73.7
Regenerated Abundance (Imported seed)	28.8	1.26	56.2
Banner	26.5	1.48	65.1
Regenerated Abundance (Ontario seed)	29.3	1.35	59.8

In averaging the results from the eight plots sown with a grain drill, we obtained a yield of 66.4, and from those sown broadcast, 61 bushels per acre.

GROWING GRAINS IN MIXTURES FOR GRAIN PRODUCTION.

It is interesting to learn from the November report of the Ontario Bureau of Industries that there were 474,530 acres in Ontario devoted to the growing of grains mixed together in certain combinations in the year 1909. As in the previous year, Wellington County had the greatest area of mixed grains for grain production. Naturally, those counties most deeply concerned in stock raising are the counties which devote a good deal of attention to the growing of mixed grains in proper combinations for producing large yields of grain suitable for stock feeding.

Within the past twenty years, a large amount of experimental work has been carried on at the College with the object of gleaning reliable information regarding the value of different seed mixtures in comparison with one another, and with the same grains when grown separately for the production of both grain and straw. Most of these experiments have been conducted for several years in succession, and the results which have already been obtained have exercised a considerable influence throughout Ontario in the general sowing of certain grains in definite proportions.

An experiment was conducted for five years in succession in growing oats, barley, spring wheat, and peas separately and in eleven different combinations, having two, three, or four grains in each mixture. The results show that the grain which was sown in mixtures produced larger yields per acre than the same kinds of grains sown separately in from ninety to ninety-five per cent. of the tests. Of the eleven different mixtures used, the combination of oats and barley gave the highest average yield of threshed grain per acre. This mixture also gave a decidedly larger yield than any of the grains grown separately.

Another experiment was conducted in duplicate in each of five years, in order to ascertain whether a seed mixture composed of one bushel of oats and one and one-half bushels of barley per acre could be improved by the addition of a small quantity of some other kind of seed. In addition to the mixture of oats and barley here mentioned, one-half bushel of flax, Emmer, spring wheat, and hulless barley were added, making in all five different combinations. The average results of the ten tests made in the five years show that the greatest yield of grain per acre was produced by the use of oats and barley without the addition of any other kind of grain, as included in this experiment.

Different Proportions of Barley and Oats Grown Together.

In each of six years, an experiment was conducted in duplicate at the College by sowing nine different proportions of oats and barley in order to determine which mixture and which quantity of seed would give the best results in the production of grain and straw. The lightest seeding used consisted of one-half bushel of oats and one-half bushel of barley, and the heaviest seeding of one and one-half bushels of oats and one and one-half bushels of barley per acre. The experiment was started in 1899 and finished in 1904. The average results show that the greatest number of pounds of grain per acre was produced from a mixture of one bushel of oats (34 pounds) and one bushel of barley (48 pounds) or a total amount of 82 pounds of mixed seed per acre.

Another experiment was started in the spring of 1907 and has been conducted for three years in succession. This also consisted in testing nine different proportions of oats and barley. A mixture of four pecks of oats and four pecks of barley, by weight per acre, was the only mixture which was similar in this and in the previous experiment. The experiment was conducted twice in 1907; once by using the Mandscheuri barley and the Daubeney oats, and once by using the Chevalier barley and the Siberian oats. In 1908 an experiment was conducted the same as 1907, with the exception that the two-rowed Canadian barley was used instead of the Chevalier barley in combination with the Siberian oats. In 1909, the varieties used were similar to those described for 1908. The following table gives the average of the duplicate results of this experiment for the three years in tons of straw and in pounds of grain per acre, and also shows the average percentage of each kind of grain in the crops produced:

Mixtures. Quantities of Seed sown per acre by weight.	Percentage of Oats and of Barley in crop (3 years)		Average yield per acre. (3 years).	
	Oats.	Barley.	Straw.	Grain.
			tons.	lbs.
3 pecks oats, 3 pecks barley	38	62	1.40	2,303
3 " 4 "	32	68	1.42	2,277
3 " 5 "	27	73	1.39	2,342
4 " 3 "	45	55	1,43	2,302
4 " 4 "	40	60	1.43	2,399
4 " 5 "	34	66	1.38	2,376
5 " 3 "	48	52	1.43	2,340
5 " 4 "	49	51	1.32	2,323
5 " 5 "	39	61	1.33	2,255

It will be seen in this experiment, as in the one previously referred to, that the largest yield of grain per acre was produced by a combination of four pecks of oats and of four pecks of barley, or from a mixture of one bushel of each, by weight. A combination of four pecks of oats and of five pecks of barley per acre produced the second highest yield of grain, but it will be noticed that, although there was an increase of twelve pounds of seed per acre, there was a decrease of twenty-three pounds of grain per acre, or a difference of thirty-five pounds in favor of the mixture of one bushel per acre of each kind of grain. A study of the relative proportions of grain in the average crops produced is interesting and worthy of examination.

Another experiment was started in 1907 and has now been conducted for three years in succession, in comparing different varieties which can be grown in combination in order to find out the most desirable mixtures for use. A medium ripening variety of oats and a medium ripening variety of barley do not, as a rule, mix well together, owing to the fact that barley generally ripens several days earlier than oats. For this purpose a very early variety of oats should be used with a six-rowed barley, such as Mandscheuri, or a very late variety of barley should be used with an ordinary maturing variety of oats, such as the Banner. If this precaution is not taken the varieties will not ripen together and the results are decidedly less satisfactory, even though the yields might in some cases be slightly greater. The following table gives the average results in yield of both straw and grain per acre for the three years.

MIXTURES OF BARLEY AND OATS—YIELDS FOR THREE YEARS.

The results of the three years' experiments in testing nineteen different mixtures show that the mixture of Mandscheuri barley and a very early variety of oats, such as the Daubeney or the Alaska, give high results in yield of grain per acre. A mixture of Mandscheuri barley and Banner oats gave a yield of fully one hundred pounds per acre less than the mixture of Mandscheuri barley and Daubeney oats in the average of the three years' experiments. The combination of Mandscheuri barley and flax has also given particularly good results.

Mixtures. Quantities of seed per acre, by weight.	Percentage of Barley and other grains in crop. (3 years)		Average Yield per acre. (3 years)	
	Barley.	Other Grains.	Straw.	Grain
			tons.	lbs.
Black Hulless Barley, 60 lbs., Common Emmer, 40 lbs.	62.16	37.84	1 28	2,089
Guy Mayle Hulless Barley, 60 lbs., Siberian Oats, 34 lbs.	47.81	52.19	1.54	2,443
Black Hulless Barley. 60 lbs., Siberian Oats, 34 lbs.	58 25	41.75	1.40	2,239
Two-rowed Canadian Barley, 48 lbs., Banner Oats, 34 lbs.	54.24	45.76	1.56	2,433
Two-rowed Canadian Barley, 48 lbs., Siberian Oats, 34 lbs.	54.43	45.57	1 49	2,350
French Chevalier Barley, 48 lbs., Siberian Oats, 34 lbs	52.24	47.76	1.80	2,460
Mandscheuri Barley, 48 lbs., Daubeney Oats, 34 lbs.	72.54	27.46	1.35	2,659
Mandscheuri Barley, 48 lbs, Alaska Oats, 34 lbs	69.54	30.46	1.44	2,639
Mandscheuri Barley, 48 lbs., Siberian Oats, 34 lbs.	67.25	32.75	1.36	2,317
Mandscheuri Barley, 48 lbs., Banner Oats, 34 lbs.	66.98	32.02	1.49	2,552
Mandscheuri Barley, 48 lbs., Joanette Oats, 34 lbs.	70.84	29.16	1.54	2,475
Mandscheuri Barley, 48 lbs., Black Hulless Barley, 60 lbs.	61.38	38.62	1.28	2,442
Mandscheuri Barley, 48 lbs., Guy Mayle Hulless Barley, 60 lbs	69.46	30.54	1.35	2,535
Mandscheuri Barley, 48 lbs., Dakota Mammoth Rye, 56 lbs.	63.95	36.05	1 56	2,135
Mandscheuri Barley, 48 lbs., Common Emmer, 40 lbs	72.38	27.62	1.34	2,460
Mandscheuri Barley, 48 lbs., Wild Goose Spring Wheat, 60 lbs.	72.41	27.59	1.46	2,346
Mandscheuri Barley, 48 lbs., Early Britain Peas, 60 lbs.	86.52	13.48	1 36	2,534
Mandscheuri Barley, 48 lbs., Prussian Blue Peas, 60 lbs.	84.67	15.33	1.50	2,301
Mandscheuri Barley, 48 lbs,, Flax, 56 lbs	88.94	11.06	1.42	2,667

EIGHT KINDS OF GRAIN GROWN IN COMBINATION.

In each of three years an experiment has been under way in which eight kinds of grain have been used in different combinations. One of the principal objects of this experiment has been to learn which of the eight kinds of grain will produce the greatest percentage of both straw and grain in the crop produced. The mixtures have been made up in two different ways: 1st, by using the same amount of seed of each variety as is usually sown when the grains are grown separately, and 2nd, by using equal quantities of seed of all the varieties. Each of the mixtures here described was sown at the rate of 112 pounds of seed per acre. Both parts of the experiment were conducted in duplicate each year. The following table gives the average results of the two tests in each of three years, and shows the percentage of each grain in the crop produced for each of the methods of combination indicated above.

These results are interesting from the fact that they show great variations in the power of the different varieties to reproduce themselves in competition with other varieties and classes of grain. The Mandscheuri variety of barley produced a greater percentage in the crop yielded, in the results of each experiment for 1909 and for the average of the three year period. Spring rye, Wild Goose wheat, field peas, and hulless barley do not possess the power of fighting their way in a mixture as well as either six-rowed barley or oats.

PERCENTAGE OF GRAINS IN MIXTURES.

Varieties used in each mixture.	Uniform weights of seed sown. 6 tests.		Quantities of seed in same proportion as when grown separately. 6 tests.		Average of two classes of mixtures 3 years. 12 tests.
	1909.	Average 3 years. 1907-09.	1909.	Average 3 years. 1907-09.	Average of two averages.
Six-rowed Barley (Mandscheuri)	22.5	25.8	21.1	24.1	25.0
Oats (Banner)	21.0	19.4	13.1	12.7	16.1
Spring Wheat (Red Fife)	10.5	11.8	14.0	13.1	12.4
Emmer (Common)	12.5	11.1	13.3	12.9	12.0
Spring Rye (Dakota Mammoth)	10.3	10.1	11.1	9.7	9.9
Spring Wheat (Wild Goose)	6.9	7.8	8.6	9.7	8.7
Field Peas (Early Britain)	9.9	6.7	11.6	9.8	8.3
Hulless Barley (Guy Mayle)	6.4	7.3	7.2	8.0	7.6

These results, when compared with those of another experiment which was started in 1902 and which was conducted for six years in succession by using twelve different kinds of grains, furnish some interesting data. The average results of the former experiment for the six-year period were as follows:

Varieties used in each Mixture.	Percentage of Grains in Mixtures.	
	Uniform weights of seed sown 6 yrs. 12 tests.	Quantities of seed in same proportion as when grown separately, 6 years, 12 tests.
Six-rowed Barley (Mandscheuri)	18.1	17.1
Spring Rye (Common)	13.3	14.1
Hulless Barley (Black)	12.5	14.2
Early White Oats (Alaska)	12.7	9.4
Black Oats (Joanette)	11.9	8.6
Emmer (Common)	7.0	7.9
Hulless Barley (White)	5.8	6.9
Peas (Field)	4.4	7.6
Spring Wheat (Wild Goose)	4.8	6.3
Grass Peas	5.6	4.7
Vetches (Common)	2.3	1.9
Flax (Common)	1.8	1.3

It will be seen from the examination of the results of the two experiments that the Mandscheuri barley has given the highest percentage of grain in the crops grown in the different mixtures in every instance. Emmer occupies a medium place in the average percentage of grain in comparison with the other classes, being about the same in the ripened crop as it occupied in the seed before it was sown. All of these experiments go to confirm the results of other experiments and to show that it is difficult to make a mixture which will produce a heavier yield per acre than one made by a combination of barley and oats.

DIFFERENT VARIETIES OF THE SAME CLASS OF GRAIN GROWN IN COMBINATION.

Different varieties of winter wheat, of oats and of barley have been grown separately and in combination, with the object of ascertaining whether or not there was any advantage in growing mixtures as against growing the varieties separately. The results of experiments conducted with winter wheat for five years and of barley and of oats each for three years, show that the mixtures have given very similar results to the averages of varieties when grown separately. The results of our experimental work up to date, therefore, seem to strongly indicate that there may be a decided advantage from growing different classes of cereals together, but that there is no marked advantage from growing different varieties of the same class in combination.

VARIETIES OF BARLEY.

According to the Crop Bulletin for November, 1909, the area devoted to barley in the present year was 695,262 acres. This area, in comparison with 438,784 in 1898 and 490,374 acres in 1899, shows a great increase in the number of acres devoted to the barley crop in Ontario during the last decade. Not only has the area been greatly increased, but we find that the yield of threshed grain per acre has increased 22.7 per cent. in the last twelve years, as compared with the average of the twelve years previous. The market value of the barley crop in Ontario in 1908 was more than double that for 1898. These increases have been due, in no small extent, to the introduction, distribution, and general cultivation of better varieties of barley than were grown previously.

Although the two-rowed barleys are grown extensively in a number of the European countries, the six-rowed varieties are used almost entirely in Ontario. They produce larger yields of grain per acre in nearly all instances. A large number of different varieties of six-rowed, two-rowed and hulless barleys, obtained from various countries, have been carefully tested in our experimental grounds. Practically all varieties have been grown for at least five years in succession, after which period the poorer varieties have been dropped and those making the most satisfactory returns have been retained for further experimental work. Whenever new and promising varieties are introduced from any source, whether through plant breeding work at the College or through importations from other countries, they are tested in the experimental grounds in competition with the other varieties. In this way the list is gradually changing as some of the varieties are dropped from the list and new varieties are added from time to time. There are indeed very few varieties of barley in America which we have not had in our comparative tests.

The accompanying table gives the average results of each of eighteen varieties of six-rowed barley, eight varieties of two-rowed barley, and seven varieties of hulless barley which have been grown in the experimental plots during the past five years:

Classes and Varieties.	Bearded or Beardless.	Color of Grain.	Average Height.	Per cent. of Rust.	Days to Reach Maturity.	Weight per Measured Bus.	Yield per Acre.	
							Straw.	Grain.
SIX-ROWED:			Ins.			Lbs.	Tons.	Bush.
Mandscheuri	Be.	White	38	3	105	50.9	2.03	72.6
Bonanza	Be.	White	38	3	104	50.6	1.64	70.9
California Brewing	Be.	White	32	8	106	46.6	1.79	68.9
Triumph	Be.	White	39	3	104	51.2	1.82	68.5
Oderbrucker	Be.	White	37	3	104	50.9	1.87	67.1
University No. 105	Be.	White	38	3	104	50.0	1.72	65.8
Common six-rowed	Be.	White	38	3	103	51.5	1.77	63.3
Scotch Improved	Be.	White	36	3	105	51.3	1.77	61.5
Mensury	Be.	White	35	4	104	52.1	1.82	61.2
Argentine Barley	Be.	White	30	11	108	45.6	1.50	57.0
Imperial six-rowed	Be.	White	35	3	103	52.3	1.64	55.8
Black French	Be.	Black	30	7	104	49.5	1.34	55.0
Success	Ba.	White	35	2	96	47.5	1.43	51.1
Ohio Beardless	Ba.	White	39	4	101	46.1	1.71	51.0
Champion Beardless	Ba.	White	35	2	96	47.6	1.42	49.7
Dakota Silver Beardless	Ba.	White	38	4	101	46.5	1.58	46.7
Humboldt	Ba.	White	34	2	96	47.1	1.40	46.2
Zero	Be.	White	37	6	119	52.2	2.15	44.7
TWO-ROWED:								
Imported No. 5,591 Iowa	Be.	White	32	4	111	53.1	1.91	60.7
Hanna No. 5,590 Iowa	Be.	White	32	4	109	53.8	1.79	59.8
Jarman's Selected Beardless	Be.	White	33	4	109	53.4	1.85	58.5
Hanna Gerste	Be.	White	32	4	110	53.2	1.82	56.7
Two-rowed Canadian	Be.	White	35	5	110	52.6	1.83	48.0
French Chevalier	Be.	White	32	6	115	51.5	1.88	47.0
New Zealand Chevalier	Be.	White	33	6	115	50.9	1.97	45.8
Duckbill	Be.	White	34	5	111	51.6	1.79	45.1
HULLESS:								
Purple	Be.	Purple	27	4	100	63.2	1.62	43.0
Guy Mayle	Be.	Green	25	4	99	60.7	1.55	41.1
Winnipeg No. 2	Be.	White	26	4	104	59.6	1.72	39.3
Black Hulless	Be.	Black	29	5	101	62.5	1.55	38.6
Hog	Be.	White	26	3	104	60.2	1.65	37.3
Hungarian	Be.	White	31	4	106	59.5	1.57	36.8
New White Hulless	Ba.	White	31	7	107	59.7	1.82	28.9

It will be seen that, although a number of the poorer varieties of barley have been discarded from our list from time to time, there is yet a great variation in the average yield per acre of the varieties which are at present under competition. It will be observed that there is a variation in the yield of about twenty-eight bushels per acre in the case of the six-rowed barleys, fifteen bushels per acre in the case of the two-rowed barleys, and of fourteen bushels per acre in the case of the hulless barleys; hence, it is important to study carefully the results of the different varieties in order to secure the best.

It will also be observed that all of the beardless, or as they are sometimes called, the bald varieties, occupy a comparatively low place in average yield of grain per acre. The highest yielding bald variety gives an average yield of grain of 21.5 bushels per acre per annum less than the average yield of the Mandscheuri variety. It will also be observed that in the average yield per acre for five years, some of the well-known varieties are greatly surpassed in productiveness by some of the newer kinds, as for instance, the Common six-rowed by the Mandscheuri by an average of 9.3 bushels per acre, the Duckbill by the two-rowed

Imported No. 5591 by 15.6 bushels per acre, and the Black hulless by the Purple hulless by 4.4 bushels per acre per annum.

MANDSCHEURI BARLEY. In the spring of 1889 one pound of the Mandscheuri barley, which was obtained from Russia, was sown on a small plot in the Experimental department to be tested with sixty other varieties. It produced comparatively stiff straw and gave a large yield of barley, which was of good feeding quality, being fairly thin in the hull and plump in the grain. It has continued to give good results, the average for the twenty-one years being 70.5 bushels of grain per acre in the experimental plots. Small quantities of the Mandscheuri barley have been distributed in each of the past sixteen years to those farmers who applied for the experiment with barley in connection with the Experimental Union. From these one-pound lots so distributed, there are now about 570,000 acres of the Mandscheuri barley grown in Ontario annually. The introduction of this barley has had a wonderful influence on the barley production of this Province.

O. A. C. NUMBER 21 BARLEY. This is a new variety of barley originated at the College through selection. As it has not been grown with the regular varieties for five years in succession, it is not entered in the accompanying table, but it is exceedingly important that this variety should be mentioned in the comments on the results of barley, as it is evidently surpassing the Mandscheuri and is an exceedingly popular variety amongst the farmers who have grown it, not only in small plots, but also in their larger fields.

In the spring of 1903, 9,972 selected grains of the Mandscheuri barley were planted by hand at equal distances apart in the Experimental department at the College. When the plants were ripe, they were carefully examined and thirty-three of the most promising ones were selected, harvested, and threshed separately. In 1904, thirty-three separate lots of barley were grown from the plants selected in the year previous. From that time forward only the best strains were grown in the tests as follows: Fourteen in 1905, eight in 1906, seven in 1907, three in 1908 and three in 1909. In one instance, over forty bushels of barley were grown in 1905, as the product of one seed planted in the spring of 1903. Of all the selected strains, the one which is known as the O. A. C. Number 21 has made the best record. In each of the last three years, it has actually given better results than the Mandscheuri variety in yield of grain, in freedom from rust, and in both length and strength of straw, in the co-operative tests throughout Ontario. The grain is quite easily distinguished from that of the Mandscheuri barley.

In connection with the Ontario Agricultural and Experimental Union, one pound lots of the O. A. C. Number 21 barley were sent out with two other varieties to applicants in each of the past four years. Several thousand bushels of this barley were grown in Ontario from these small lots in 1908, and the growth in 1909 must have been very large as the reports were exceedingly favorable from the crop of 1908 and a great deal of grain was sold for seed purposes. One farmer in Huron County harvested 900 bushels of the O. A. C. Number 21 barley in 1908, which was the third crop produced from one pound of seed sown in the spring of 1906.

At the Winter Fair in Guelph in December of this year, seventeen lots of barley were entered in competition. Of this number, twelve were the Mandscheuri and five the O. A. C. Number 21. Of the seven prizes which were awarded, four went to Number 21 barley. This information is interesting in showing what a stronghold the Mandscheuri barley has had in Ontario and also as to how the O. A. C. Number 21 barley is supplanting it. We believe that the O. A. C. Number 21 barley is the best variety which is now being grown on the farms of Ontario. A new hybrid barley which we have originated at Guelph is exceedingly promising, and in certain particulars may surpass the Number 21. This new hybrid barley, however, will not likely be distributed earlier than the spring of 1911 or 1912.

WINTER BARLEY. Two varieties of winter barley were grown at the College in 1909. One variety, known as the Wood's winter barley, which has been grown at the College for a number of years, gave a yield of 51.8 bushels per acre, and a newer variety, known as the Tennessee winter barley, gave a yield of 33.3 bushels per acre in the past year. In the average results of thirteen years at the College, winter barley has given a yield of 53.8 bushels of grain per acre. Within the past fifteen years, the winter barley has been completely killed out on three occasions. If these years were included with the thirteen referred to, it would lower the annual average yield somewhat. Winter barley has proven to be rather more tender in Ontario than winter wheat, but when it survives the winter it usually gives high yields of grain per acre.

VARIETIES OF OATS.

Of all the cereals grown in Ontario, no one class is cultivated so extensively as the oat crop. The area devoted to oats in this Province amounted to 2,695,585 acres in 1909, according to the November bulletin issued by the Bureau of Industries for Ontario. The market value of the oat crop produced in Ontario amounts to from thirty-five to thirty-eight million dollars annually.

Although about three hundred varieties of oats have been carefully tested at the Agricultural College, many of these have been dropped after five years' experiment, owing to the fact that other varieties proved more successful. Each year a few new varieties are added and a few of the more inferior kinds are dropped. In 1909, ninety-one different varieties and strains were under experiment at the College. Of this number, forty-eight named varieties have been under test for at least five years in succession. As the oat crop is such an exceedingly important one in Ontario, and as there is a marked difference in different varieties, it is considered advisable to give here in tabulated form the summary results regarding each of the forty-eight varieties grown during the past five years.

The average results of five years' experiments with each of forty-eight varieties show a marked difference in the characteristics and the productiveness of the different varieties. The table here presented furnishes some very interesting data worthy of careful study. It will be noticed that, as a rule, those varieties of oats which have given a large yield of grain per acre, have also been comparatively thin in the hull and have been only about average in weight of grain per measured bushel. Those varieties of oats which have given the lowest average yield of grain per acre have, as a rule, been comparatively thick in the hull and have given rather heavy weights per measured bushel, especially in some instances. In order to illustrate this point, your attention is drawn to the Daubeney variety which, in the average of the five years' experiments, gave a yield of 87.4 bushels per acre, a weight per measured bushel of 34 pounds, and a percentage of hull of 24.6; while the Early Dawson gave a yield of only 67.1 bushels per acre, but furnished grain which weighed 37 pounds per measured bushel, and that grain has an average percentage of hull of 35.7. The results in this table show that in many cases the varieties of oats which weigh very heavy per measured bushel give a comparatively light yield of grain per acre and furnish oats which have a large percentage of hull. We have a good deal of evidence to show that very frequently those varieties of oats which weigh heavy per measured bushel are light yielders and of comparatively poor quality.

Varieties of Oats.	Per cent. Hull 3 years.	Average results for 5 years.						Yield per acre of grain	
		Heads M. or S.	Days to mature.	Height.	Per cent. rust.	Weight per measured bushel.	Straw per acre.	1909.	Average 5 years.
				Ins.		Lbs.	Tons.	Bush.	Bush.
Daubeney	24.6	S	102	42	9	34.0	1.91	98.4	87.4
Siberian	29.2	"	107	46	12	31.5	2 11	94.6	86.9
Alaska	22.5	"	101	44	8	34.8	1.89	100.7	85 3
English Glory	27.7	"	108	48	12	34.1	2.22	81.5	84 6
Peerless	27.0	"	109	48	12	33.7	2.22	81.3	82.5
Yellow Russian	29.4	"	109	45	10	32.6	2.09	64.9	81.9
New Zealand	29.2	"	110	46	10	32.3	2.12	68.4	81.4
Ligowa (imported German seed)	28.1	"	108	46	11	34.4	2.05	80.2	80.9
Early Champion	27.6	"	104	46	10	33.5	1.96	97.8	80.8
Vick's American Banner	28.8	"	110	47	12	33.9	2.34	70.4	80 8
Newmarket	28.2	"	108	46	12	34.2	1.99	84.2	80.1
Imported 534, Iowa	27.3	"	107	46	11	33.3	2.07	74.6	80.0
Waterloo	26.3	"	109	46	10	33.7	2.09	80.5	79.8
Imported No. 545, Iowa	27.8	"	107	44	11	33.6	1.97	71.9	79.7
University No. 6	27.6	"	108	46	10	34.3	1.87	74 3	79.6
Oderbrucker	29.9	"	110	45	12	34.0	2.11	73.2	78.9
Rennie's White Irish	28.2	"	108	45	11	33.7	2.04	78.9	78.7
Liberty	29.3	"	110	46	11	32.1	2.19	68.9	78.5
Irish Victor	28.8	"	110	46	12	33.6	1.96	70.7	78.2
Abundance	28.6	"	107	46	11	33.6	2.03	74.3	78.1
Probsteier	27.4	"	109	46	11	34.7	2.05	82.0	77.9
Joanette	25.1	"	107	38	7	33.6	2.28	81.1	77.7
Prince Royal	27.3	"	108	46	15	33.6	1.94	73.4	77.0
Prosperity	25.6	"	101	43	8	34.0	1.97	98.2	76.9
White Marvel	27.5	"	109	47	11	34.6	1.88	80.4	76.2
Early Ripe	26.2	"	98	40	8	28.3	1.93	85.1	76.0
Twentieth Century	28.0	"	107	45	13	33.2	1.99	82.4	75.3
Swedish Wisconsin No. 4	28.5	"	108	46	13	32.7	2.02	72.7	75.2
Bavarian	29.1	"	109	47	9	33.6	2.27	69.2	74.9
New Sensation	28.7	"	108	44	11	34.0	1.96	76.1	74.8
Sheffield Standard	27.6	"	108	45	13	34.5	1.85	83.0	74.4
Golden Beauty	27.9	"	109	46	11	34.3	1.95	64.8	73.2
Black Tartarian	30.2	M	112	45	11	30.6	2.15	66.6	72.9
Tobolsh	27.5	S	108	45	12	34.8	1.96	72 4	72.8
Waverley	28.2	"	111	46	12	34.2	2.02	57.8	71 9
Egyptian	30.6	M	109	45	12	35 9	2.28	71.5	71.1
Storm King	34.1	"	108	45	11	33.0	2 12	77.2	71.1
Scarboro	27.0	"	116	46	9	31.6	2.63	66.8	71.0
Sunshine	27.8	"	115	44	12	28.2	2.29	66.9	69.0
Besler's Hafer	28.1	S	112	50	12	32.8	2 34	70.2	68.9
Black Mesdag	34.0	"	99	45	18	29.8	2.18	75.4	68.1
Tartar King	32.4	M	107	47	13	33.6	2.02	73.6	68.0
Goldfinder	27.2	S	113	43	16	30.4	2.13	71.1	67.8
Pioneer	37.6	"	106	40	15	33.5	2.13	70.1	66.1
Zhelannie	34.4	"	104	48	15	34.7	2.45	83.7	64.8
Early Dawson	35.7	"	104	48	14	37.0	2.39	78.3	61.7
White Superior Scotch	34.4	"	104	48	15	36.7	2.22	61.9	56.4
Hulless Oats	......	"	106	48	9	......	2.83	49.8	43.6

NOTE.—M—Indicates mane or side oats; S—Indicates varieties having a spreading head.

The Daubeney and the Siberian variety of oats which head the list in average yield per acre for five years, are varieties which have been very prominent both in the experiments at the College and in the co-operative tests over Ontario, during the last few years. The Daubeney variety is a very early oat and possesses straw of medium height, a spreading head, and white grain of excellent quality, as indicated by the thinness of the hull. The Siberian variety possesses very good straw and is a large yielder of grain, but the weight per measured bushel in 1909 and 1906 was comparatively light, which lowers the average for the five years. The American Banner now stands tenth in the list in yield of grain per acre. Its yield in 1909 was much lower than usual. It is probably safe to say that the two varieties of oats most extensively grown in Ontario at the present time are the Vick's American Banner and the Siberian. The Daubeney appears to be grown more than any other variety for the purpose of mixing with six-rowed barley, such as the Mandscheuri, when oats and barley are grown in combination for grain production. The Sensation variety of oats, although furnishing an attractive grain which usually does very well at exhibitions, has not given as large yields per acre in the experiments at Guelph or in the co-operative experiments over Ontario, as some of the other varieties.

Besides the forty-eight varieties here mentioned, we grew forty-three varieties, strains and hybrids in 1909, but as these oats have not, as yet, been grown for five years in succession, the results are not presented in the accompanying table. Some most interesting results have been obtained, especially from some of the strains and from some of the hybrids. We have one hybrid between the Joanette and the Siberian which is an exceptionally heavy yielder. We also have another hybrid obtained from crossing the same two varieties which possess a white grain and which is thinner in the hull than any variety of oats which we have grown at the College. Fuller information regarding the new varieties, the improved strains, and the promising hybrids will be furnished after further experiments at the College.

PERCENTAGE OF HULL IN OATS.

In order to show the marked difference in the percentage of different varieties of oats and to show that these percentages remain in about the same order throughout a variety of seasons, a table is here appended giving the percentage of hull of each of four varieties in each of eight years.

Varieties.	Percentage of Hull.								
	1902	1903	1904	1905	1906	1907	1808	1909	Average 8 years.
Joanette......	22.5	23.1	22.5	24.0	25.2	23.4	23.9	25.4	23.8
Daubeney.....	26.1	25.1	23.0	26.3	26.3	24.7	23.8	25.4	25.1
Early Dawson.	32.6	33.7	32.4	36.0	38.1	33 7	36.6	36.8	35.0
Pioneer	48.1	36 8	36.9	36.8	42.8	38.8	37.4	36.7	39.3

It will be seen from the table here presented that the Joanette, which is a black variety of oats, has given an average in eight years of only 23.8 per cent. of hull, while the Pioneer, which is also a black variety of oats, has given an average during the same period of 39.3 per cent. of hull. Many people do not give proper consideration to the quality of the oats when growing the varieties on their farms or when buying the grain for feeding purposes. Here we have two varieties of oats grown for eight years in succession under similar conditions, and yet one variety will furnish on the average 15 1-2 pounds of meal for one hundred pounds of grain more than the other variety. The hull has but little value over the same weight of straw, hence a thin hulled oat is of very much higher feeding value than one possessing a thick hull.

THE STRENGTH OF STRAW OF OATS.

We have, of late, received many inquiries regarding varieties of oats which are not apt to lodge before they ripen. We take careful notes of the percentage of each crop which lodges each year in the general experiments with the oats. During the last three years, however, a special experiment has been conducted by growing a few varieties of oats in duplicate on low land, in order to study very carefully the strength of the straw under rather severe conditions. The following table gives the percentage of crop lodged three weeks before ripening and also at the time of ripening of each variety of oats in 1909, and also in the average of three years' experiments:

Varieties.	Percentage lodged three weeks before ripening.		Percentage lodged when ripe.	
	1909	Average 3 years.	1909	Average 3 years.
Siberian	76	32	81	80
Golden Beauty	83	33	87	80
Liberty	29	10	40	32
Sheffield Standard	45	22	85	91
Banner	29	11	55	54
Tartar King	34	12	72	87
Daubeney	55	40	62	58
Early Champion	25	22	30	52

From the results here presented, it will be seen that those varieties possessing the stiffest straw when ripe, in the average of the six tests of the past three years, are the Liberty, the Early Champion, the Banner, and the Daubeney; and those possessing the weakest straw are the Sheffield Standard and the Tartar King. The percentage lodged three weeks before ripening show results slightly different from those obtained at the time of maturity. Particularly is this noticeable in regard to the Tartar King, which possesses straw which is comparatively stiff during the growing period, but which frequently becomes very brittle and of exceptionally poor quality when the oats are maturing.

In 1909, the Regenerated Abundance variety of oats was introduced into this experiment, and the strength of the straw was determined. It occupied an intermediate position, being slightly stiffer in the straw than the Tartar King but weaker than the Liberty, the Banner, or the Early Champion.

THE CLASSIFICATION OF WHEAT.

According to some authorities, there are seven, and according to other authorities, there are eight distinct types or species of wheat. We have in the past been adhering to the classification which is made up of the seven types. A study of the different classes of wheat is very interesting and instructive, as the different classes possess different characteristics. The species may be enumerated as follows:

(1) Common, fine, or soft wheat (*Triticum vulgare*).
(2) Turgid, or toulard wheat (*T. turgidum*).
(3) Hard, or flinty wheat (*T. durum*).
(4) Polish wheat (*T. polonicum*).
(5) Spelt (*T. spelta*).
(6) Emmer, or starch wheat (*T. dicoccum*).
(7) One-grained wheat (*T. monococcum*).

All of these types are grown annually at the Agricultural College at Guelph, and the most of them, more or less, over the Province. The greater number of wheats of both the winter and the spring varieties which are grown in Ontario belong to the first class and are used very largely for the production of flour.

VARIETIES OF WINTER WHEAT.

Fully two hundred and sixty varieties of winter wheat have been grown at the Agricultural College within the past twenty years. All varieties are carefully tested for a period of five years, after which the inferior kinds are dropped and the most promising sorts are continued in future tests. In 1909, sixty-one varieties, besides a number of selections and hybrids, were under experiment. Of this number, ten varieties have been grown for less than six years, and fifty-one varieties for six years or over. As each of fifteen varieties has been grown for at least fourteen years, the average results of these are of special value. The following table gives, for each of these fifteen varieties, the average weight per measured bushel for thirteen years, the yield of grain per acre for 1909, and the average yield of both straw and grain per acre for the fourteen year period:

Variety.	Color of Grain.	Weight per measured bushel. 13 years.	Yield per acre.		
			Grain. 1909.	Average 14 years.	
				Straw.	Grain.
		lbs.	bus.	tons.	bus.
Dawson's Golden Chaff	White	60.2	47.0	3.2	54.8
Early Genesee Giant	White	60.4	50.0	3.3	50.4
Imperial Amber	Red	61.1	28.6	3.4	49.6
Russian Amber	Red	61.3	37.9	3.4	48.9
Egyptian Amber	Red	61.7	36.4	3.4	48.4
Early Red Clawson	Red	59.4	32.2	3 0	48.1
Rudy	Red	61.3	37.7	2.8	46.4
Geneva	Red	62.5	33.7	3.1	45.1
Tasmania Red	Red	61.9	24.9	3.1	44.7
Turkey Red	Red	61.6	34.4	2.9	44.7
Kentucky Giant	Red	61.5	40.4	3.0	44.7
Treadwell	White	60.9	42.3	3.0	44.6
Tuscan Island	Red	61.2	28.1	3.1	44 4
Bulgarian	White	61.0	37.4	2.9	44 4
McPherson	Red	62.1	33.2	2.8	43.0

The average results of the fifteen varieties are as follows: Weight per measured bushel, 63.1 lbs. for 1909 and 61.2 lbs. for the fourteen year period; and yield of grain per acre, 36.3 bus. for 1909 and 46.8 bus. for the fourteen year period. It will therefore be seen that in the experiments at the College in 1909, the winter wheat gave a yield per acre somewhat below the average, but grain of superior quality, the weight per measured bushel being surpassed only once in fourteen years.

The Dawson's Golden Chaff stands the highest in the average yield of grain per acre of the fifteen varieties tested in each of fourteen years. It produces a very stiff straw of medium length, beardless heads with red chaff, and white grain somewhat soft but about the standard in weight per measured bushel. The Early Genesee Giant furnishes a straw of medium length and of fair strength, a short, compact, bearded head, and a grain of fairly good quality. The Imperial Amber produces a large amount of straw which is somewhat weak, a bearded head with red chaff, and a red grain of average quality. The straw of the Geneva, Tasmania Red, Turkey Red, Kentucky Giant and Tuscan Island is comparatively weak, but the grain is hard and weighs well per measured bushel.

Fifty-one varieties of winter wheat, grown in 1909, have been under experiment for at least six years. In the six years' test, the highest average yields of grain per acre have been produced by the Dawson's Golden Chaff (48.3 bus.) and eight other varieties, which resemble it very closely and which have yielded as follows: American Banner, 50.8 bus.; American Wonder, 50.3 bus.; Abundance, 49.7 bus.; Beardless Rural New Yorker No. 6, 49.6 bus.; Prize Taker, 46.9 bus.; Superlative, 46.3 bus.; Forty-fold, 46.1 bus.; and Extra Early Windsor, 44.8 bus. The highest average yields produced by varieties of other types in the six years' experiment are as follows: Genesee Reliable, 44.4 bus.; Prosperity, 44.4 bus.; and Crimean Red, 43 bus.

The heaviest weights of grain per measured bushel in the six years' test have been produced by the Northwester, 62.7 lbs.; Genesee Reliable, 62.3 lbs.; Geneva, 62.2 lbs.; Auburn, 62.1 lbs.; and Kentucky Giant, 62.1 lbs.

Of the sixty-one varieties of winter wheat, grown in 1909, the greatest yields of grain per acre were produced by the Prosperity, 54 bus.; No. 8 Red, 52.2 bus.; American Banner, 50.3 bus.; Early Genesee Giant, 50 bus.; Extra Early Windsor, 47.9 bus.; New Mammoth Amber, 47.5 bus.; Dawson's Golden Chaff, 47 bus.; and Economy, 46.9 bus., and the heaviest weights per measured bushel by the Northwester, 64.8 lbs.; Amherst Isle, 64.1 lbs.; Alberta Red, 64 lbs.; Michigan Amber, 63.9 lbs.; Genesee Reliable, 63.9 lbs.; McPherson, 63.9 lbs.; and Egyptian Amber, 63.8 lbs.

In 1906, in 1907, and again in 1908, the varieties of winter wheat grown in the Experimental department were tested for bread production in the Bakery branch of the Chemical department of the College. The varieties of wheat which produced the largest loaves of bread from equal quantities of flour in the average of three years' experiments are as follows: Crimean Red, Yaroslaf, Banatka, Turkey Red, McGarvin, Winter Red Fife, Northwester, Rudy, Tasmania Red and McPherson. These all possess red grain, and with two exceptions, bearded heads.

From the results of experiments conducted with different varieties of wheat at the College, it seems to be generally true that white wheats yield more grain per acre, possess stronger straw, weigh a little less per measured bushel, are slightly softer in the grain, produce a more popular pastry flour and furnish a somewhat weaker flour for bread production than the red varieties.

A considerable amount of work has been done during the past few years with the object of improving some of the best varieties of winter wheat by means of systematic selection and by cross-fertilization. It is interesting to note that during the last two years the highest results of all the winter wheat experiments both in yield of grain per acre and in weight of grain per measured bushel have been obtained from some of the selections and from some of the hybrids. In 1909, no less than 21,365 hybrid plants of winter wheat were grown separately in the experimental grounds. Besides these, fifty-nine distinct plots of hybrids were under test. The results are very promising.

Varieties of Spring Wheat for Flour Production.

Spring wheat is not grown as extensively in Ontario as it was a few years ago, but in the northern and eastern parts this crop still receives a considerable amount of attention. Not only have we had under experiment the different varieties obtainable in Ontario, but we have imported other kinds from various countries of the world, and have tested them under similar conditions with those which we have grown in this Province. In order to present the results in as concise a form as possible, we have placed in the accompanying table the characteristics and the yields of each of twenty-two different varieties which have been grown for the past five years in succession.

Varieties,	Bearded or Bald.	Color of Grain,	Average Height.	Per cent. of Rust.	Days to reach maturity.	Weight per measured bushel.	Yield per acre.	
							Straw.	Grain.
			Ins.			Lbs.	Tons.	Bus.
Minnesota No. 163....	Ba.	Red	43	5	121	59.9	1.92	35.3
Climax..............	Be,	Red	46	4	119	60.9	1.93	34.9
Red Fife.............	Ba.	Red	44	6	121	60.0	1.89	34.8
Wellman Fife........	Ba.	Red	44	7	121	59.8	1.98	34.2
Carleton.............	Be.	Red	46	7	121	60.9	2.01	34.0
Saxonka.............	Be.	Red	46	4	120	61.0	1.83	33.6
Hungarian......... .	Be.	Red	40	4	116	63.0	1.82	33.6
Blue Democrat.......	Be.	Red	46	7	120	60.8	1.83	33.5
Pringle's Champion ..	Be.	Red	45	5	120	60.3	1.87	32.8
White Russian.......	Ba.	Red	42	5	122	59.2	1.84	32.2
Red Fern............	Be.	Red	45	6	120	61.0	1.74	32.1
Preston..............	Be.	Red	43	8	117	60.1	1 66	31.1
Kolben	Ba.	Red	43	4	122	60 5	1.78	31 1
Herison Bearded.....	Be	Red	43	5	120	63.2	1.69	30.6
Perron Red..........	Ba.	Red	43	5	121	59.3	1.80	30.0
Minnesota No. 169....	Ba.	Red	44	4	122	59.7	1.70	29.8
Early Wonder........	Ba.	Red	45	3	124	59 1	1.80	29.2
French Wheat	Be. &Ba.	Red	43	10	120	61.3	1.80	29.0
Colorado.............	Be.	Red	44	7	115	60.3	1.78	28.3
Russian (Argentine)..	Be.	Red	40	19	120	60.9	1.81	27.9
Chubut..............	Ba.	Red	40	17	115	61.9	1.65	27.5
Perron White........	Ba.	White	43	9	118	57.9	1.54	27.5

The variety of spring wheat which occupies the highest place in yield of grain per acre is known as the Minnesota No. 163, and is a special selection made at the Minnesota Experiment Station a few years ago, under the guidance of Prof. W. M. Hays, who is now Assistant Secretary of Agriculture for the United States. We are sorry that this wheat does not give a heavier weight per measured bushel, the average for the last five years being 59.9 pounds or a trifle below the standard. The Hungarian variety, although standing seventh in the list in yield of grain per acre, has produced an average of only 1.7 bushels per acre less than the Minnesota No. 163 and it has produced a grain which weighs very heavily indeed, the average of the five years being 63 pounds per measured bushel; hence the Hungarian wheat weighs about three pounds per measured bushel more than the Minnesota No. 163 over the five year period. The Red Fife is also three pounds per measured bushel less than the Hungarian variety. The baking tests made with the Hungarian this last year showed it to be a good bread producer. The Hungarian variety was imported from the Argentine Republic a few years ago through the kindness of one of our students who arranged to have this variety sent to us in order that we might test it in Canada, as it had been giving such good results in the Argentine Republic. We distributed this variety of wheat throughout Ontario in 1908 for the first time, and the average results of the experiments conducted on fifteen farms showed that it gave a little larger yield of both straw and grain per acre and was somewhat more popular with the experimenters than the Red Fife variety. As the demand was so great in 1908 for this variety we were unable to grow a sufficient amount that year for distribution in the spring of the present year.

VARIETIES OF SPRING WHEAT FOR THE PRODUCTION OF MACARONI.

The hard or flinty wheats (*Triticum durum*) are used largely for the manufacture of macaroni, but are now used more extensively than they were in former years for the production of flour which is frequently blended with the flour of the winter wheats, in order to give greater strength to the latter. Of this class of wheats, six varieties have been grown for seventeen years in succession. The following table gives certain average results for five years and of others for seventeen years of each of the six varieties here referred to.

Varieties.	Average Results for 5 years.				Average Results for 17 years.		
	Bearded or Bald.	Average Height.	Per Cent. of Rust.	Days to Reach Maturity.	Weight per Measured Bushel.	Yield of Straw per Acre.	Yield of Grain per Acre.
		Ins.			Lbs.	Tons.	Bus.
Wild Goose	Be.	42	3	121	61.9	2.1	38.2
Medeah	Be.	43	4	116	60.4	2.0	34.1
Sorentina	Be.	44	4	117	59.8	2.1	33.7
Bart Tremenia	Be.	41	3	118	61.2	1.9	33.5
Algiers	Be.	41	5	118	58.1	2.0	31.9
Ontario	Be.	48	9	132	56.2	2.2	23.5

The variety of durum or macaroni wheat which is the best known in Ontario is the one which occupies the highest place in yield of grain per acre of all the macaroni wheats grown at the College for a period of seventeen years. The Wild Goose variety not only gives 38.2 bushels of grain per acre, but it also furnishes a grain which weighs almost 62 pounds per measured bushel. In comparison with this, we have others both in the yield of grain per acre and in the weight per measured bushel which are very much lower. The table shows that the Wild Goose spring wheat is not surpassed by any other variety in yield of grain per acre, weight per measured bushel, or in freedom from rust. The Roumania variety of wheat, which was furnished to us through the kindness of Dr. C. E. Saunders, of the Central Experimental Farm at Ottawa, in the spring of 1907, has given us very good results in the past three years, producing a yield of 36.9 bushels per acre in 1907, 36 bushels per acre in 1908, and 34.9 bushels per acre in 1909. The Iumillo variety of durum wheat, which has become quite noted in certain parts of the United States for its resistance to disease, surviving while practically all others have succumbed to rust, etc., under severe climatic conditions, has been under test at the College for the last four years, the yields being 29 bushels per acre in 1906, 33 bushels in 1907, 27 bushels in 1908, and 24 bushels in 1909. It has therefore given somewhat lower results than the Wild Goose variety in the yields of each of the past four years.

VARIETIES OF SPRING WHEAT FOR FEEDING PURPOSES.

A number of sensational articles appeared in the newspapers of Ontario and the United States a few years ago regarding a grain which was called Spelt, but which, in reality, proved to be Emmer. Although Emmer and Spelt have been grown at our College, more or less, for the last twenty years, the last named grain is scarcely known in Ontario, but the Emmer has become quite favourably known in some sections of the Province. Each of these two types or species of grain contains a number of varieties. They are used for grinding into meal for feeding to farm stock, owing to the fact that the chaff adheres to the grain and is not removed, except to a limited extent, in the process of threshing. The following table gives the average results of three varieties of Emmer and of four varieties of Spelt for a period of eight years:

Classes of crops.	Varieties.	Average result for 8 years.			Weight per measured bushel average of 7 years.	Aver. results for 8 yrs.	
		Per cent of rust.	Per cent of crop lodged.	Per cent of hull.		Straw per acre.	Grain per acre.
					Lbs.	Tons.	Lbs.
Emmer.......	Common.....	3	29	21	39.6	2.2	3,082
	Iowa	2	20	21	40.3	2.0	2,914
	Russian. ...	2	23	21	40.3	1.9	2,895
Spelt.........	Alstroum....	17	4	30	28 6	1.8	2,259
	Red.........	13	3	30	28.0	1.8	2,224
	White	13	3	31	28.1	1.6	2,002
	Dasyanthum.	14	10	29	28.6	1.7	1,884

The results here presented in tabulated form are very interesting and show the striking differences in these two classes of grain for Ontario. The great superiority of Emmer over the Spelt as a grain producer is very clearly seen by the accompanying results. Not only does this prove true in our experiments at the College, but it has also been quite manifest in the co-operative experiments throughout Ontario during the past few years. In practically all tests which have been made, the Emmer yields decidedly heavier than the Spelt. It will also be noticed that the Emmer is much thinner in the hull, is much freer from rust, but possesses a somewhat weaker straw than the Spelt. From feeding experiments conducted in some of the Agricultural experiment stations in the United States, Emmer has produced results not very different from those obtained from barley.

OTHER CLASSES OF SPRING WHEAT.

Within the past few years, sensational articles have been written in many of the papers of the United States and in some of those in Canada regarding wonderful results obtained from different kinds of spring wheat. Particularly is this true of what was locally called Corn wheat in some of the Western states, but which is better known the world over as the Polish wheat (*Triticum polonicum*), and also regarding the Alaska wheat which belongs to the class Turgid or Toulard, and is known scientifically as *Triticum turgidum.* The Alaska wheat appears to be very similar indeed in appearance to the Seven Headed spring wheat or the Miracle variety of winter wheat, both of which have been grown at the College. In order to represent the results of these varieties, as grown at the College under similar conditions and to give the reader definite and somewhat extensive information regarding the results of these different wheats, the following table furnishes the yields per acre of both the Polish and the Seven Headed varieties in comparison with the Red Fife and the Wild Goose varieties in each of thirteen years:

Year.	Red Fife. (Triticum vulgare.)	Wild Goose. (Triticum durum.)	Polish. (Triticum polonicum.)	Seven Headed. (Triticum turgidum.)
	Bus.	Bus.	Bus.	Bus.
1897	20.7	23.1	16.3	6.5
1898	34.2	48.3	27.1	24.7
1899	39.2	44.5	24.5	26.4
1900	46.3	48.4	34.5	39.4
1901	24.1	32.1	15.6	22.2
1902	31.9	33.5	29.1	25.0
1903	43.5	47.1	32.8	34.3
1904	22.2	47.1	20.1	33.2
1905	35.9	41.5	28.7	30.8
1906	33.9	36.0	19.5	28.2
1907	28.0	33.2	18.7	19.1
1908	36.3	25.6	23.8	24.5
1909	40.1	34.8	20.4	25.7

It will be seen that the Wild Goose wheat surpassed both the Polish and the Seven Headed varieties in each of the past thirteen years without an exception.

Those farmers who pay high prices for the so-called new varieties of farm crops before the experiment stations thoroughly investigate the matter, have themselves to blame. The writer believes that there are not many farmers in Ontario who are led astray by the sensational advertising of farm crops with the object of enriching the promoters of these new and wonderful varieties. The Government of Ontario is doing much to protect the farmers by its extensive system of experimental work conducted at the Ontario Agricultural College and through the medium of the Experimental Union.

VARIETIES OF WINTER RYE.

Four varieties of winter rye have been grown at the College in each of the past six years. The following average results in yield of grain per acre and in weight of grain per measured bushel have been obtained: Mammoth White, 60.5 bus., 58.1 lbs.; Washington, 56.8 bus., 58.2 lbs.; Common, 53.5 bus., 57.3 lbs.; and Thousand Fold, 52.6 bus., 57.8 lbs. In 1909, the highest yield was produced by the Mammoth White, and the lowest by the Washington variety.

In the co-operative experiments with winter rye, the average yield of grain per acre of each of three varieties distributed in the autumn of 1908 was as follows: Mammoth White, 28.1; Common, 22.1; and Washington, 19.6. In the experiments throughout Ontario, the Mammoth White surpassed the Common rye by an average of 5 bushels per acre in 1907, 5.4 bushels per acre in 1908, and 6 bushels per acre in 1909.

VARIETIES OF SPRING RYE.

Spring and winter varieties of rye are grown in Ontario to the extent of about 100,000 acres annually. The information obtained through the Bureau of Industries for the Province does not inform us regarding the comparative areas devoted to each of the two classes of rye. While it is probably correct to say that the greater acreage is devoted to winter rye, it might be said that the spring rye also forms one of the fairly prominent farm crops of the Province.

Five distinct varieties and two selected strains of spring rye were grown on our regular standard plots in the summer of 1909. Of this number, four have been grown for five years, one has been grown for four years, one for three years, and one was grown in 1909 for the first time. The following table gives the average results of the four varieties which have been grown for five years in succession:

Varieties.	Average results for 5 years.		
	Weight per measured bushel.	Tons of straw per acre.	Bushels of grain per acre.
	Lbs.		
Saatroggen	55.9	1.94	30.5
Prolific Spring	55.9	1.81	26.9
Common	55.9	1.76	26.6
Dakota Mammoth	55.5	1.73	26.2

The Saatroggen, which heads the list with an average of 30.5 bushels of grain per acre, has taken the lead in four out of the five individual years and occupied second place in 1906. It will therefore be seen that it is a very promising variety. The Saatroggen was secured in Germany when the writer was in that country in the year 1901. He made a trip of about seventy-five miles from Berlin to visit the greatest rye breeder of the country, and secured a supply of seed for growing in the experimental plots at Guelph. It is pleasing to notice that this variety has surpassed the Common Spring rye by an average of about four bushels of grain per acre and of a fifth of a ton of straw per acre per annum in the five year period. From this variety we have a new strain started from an individual plant which surpassed the parent Saatroggen variety by 4.5 bushels per acre in 1906, 1.3 bushels per acre in 1907, 3.4 bushels per acre in 1908, and 6.3 bushels per acre in 1909. It will therefore be seen that we have obtained, through importation, a spring rye which is quite superior to the common spring rye of Ontario, and from that new importation we have made a selection which is apparently quite superior to the variety from which it was selected.

VARIETIES OF BUCKWHEAT.

The acreage devoted to buckwheat in Ontario is almost double that used for the production of rye, and the number of acres seems to be gradually increasing. We find from the latest report of the Bureau of Industries for Ontario that the acreage for buckwheat for 1909 was 176,630; for 1908, 140,605; and for the average of the past twenty-eight years, 104,646. We here present the average of five years' results in growing each of five varieties of buckwheat in the Experimental department:

Varieties.	Weight per measured bushel.	Straw per acre.	Grain per acre.
	Lbs.	Tons.	Bus.
Rye Buckwheat	53.3	2.1	34.0
Common Grey	47.1	2.6	24.5
Silver Hull	51.9	2.7	23.9
New Calcutta	50.8	2.6	21.4
Japanese	45.6	2.6	20.1

Decidedly the highest average yield of grain per acre for the five year period has been produced by the Rye Buckwheat. This variety is grown extensively in Nova Scotia. It is sometimes called Sand, Notched, or Rough buckwheat. It is possibly true that this variety does not ripen quite as evenly as some of the other kinds and the crop is sometimes not quite as tall as that of the Japanese or the Silver Hull variety. Without any exception, however, in each of the past five years the Rye Buckwheat has surpassed in yield per acre each of the other varieties which has been grown in each of those years. It is interesting to note that the Rye Buckwheat has also taken the lead in weight of grain per measured bushel, but in yield of straw per acre it is less than that of any one of the other four varieties here reported.

VARIETIES OF FIELD PEAS.

Varieties.	Days to mature. Average of 13 years.	Length of vines. Average of 8 years.	Average results for 10 years.		
			Weight per measured bushel.	Straw per acre.	Grain per acre.
		Ins.	Lbs.	Tons.	Bus.
Early Britain	103	41	57.2	1.41	39.4
Potter	104	46	59.6	1.50	37.1
New Canadian Beauty	105	49	60.5	1.49	33.8
White Eyed Marrowfat	106	44	60.7	1.60	32.6
Black Eyed Marrowfat	106	44	59.7	1.45	32.6
Prussian Blue	108	48	59.9	1.64	30.1
Golden Vine	106	44	60.0	1.48	29.3
Multipliers	110	51	60.4	1.82	29.1

Owing to the ravages of the pea weevil in south-western Ontario for a period of several years, no experimental work was conducted with this crop in our experimental grounds. This was due largely to the fact that many farmers had stopped growing peas entirely and it was thought that with the united effort the pea weevil might be exterminated to a considerable extent. As the weevil has largely disappeared, the cultivation of the crop is again increasing throughout the Province.

In each of ten years, eight varieties of peas have been grown at the College under uniform conditions, and the yields per acre have been satisfactory and furnish some good information regarding the comparative results of the different varieties which are presented in the above table.

The Early Britain, which has given the highest average yield of grain per acre for the ten years, is a brown pea which was imported from England by the Ontario Agricultural College and which has made a very excellent record throughout Ontario, as well as in the experimental plots at Guelph. Although the color is probably somewhat against this pea for market purposes, the writer has been informed that the grain is very suitable indeed for the manufacture of split peas, as the manufactured product has a rich yellow appearance after the brownish skin has been removed. The Golden Vine and the Multipliers, which are small white peas and are quite well known throughout Ontario, occupy the lowest places on the list in yield of grain per acre.

In 1909, thirty-two varieties of field peas were grown in the Experimental department. In this list, a number of new varieties received through the Department of Agriculture at Washington were included, and a few of them have made very good returns, two of them giving upwards of 50 bushels of grain per acre in the experiments of the past season.

VARIETIES OF FIELD BEANS.

Although field beans are not grown very extensively throughout the Province of Ontario, they form an exceedingly important crop in the counties of Elgin and Kent, there being no less than 422,951 acres in Kent and 142,571 acres in Elgin in 1908. No other county in Ontario had as high as 40,000 acres in the same year.

Eight varieties of field beans have been grown on the experimental plots for eleven years in succession, and we here present the average yield per acre and the average weight per measured bushel of each variety for the eleven year period.

Varieties.	Average results for 11 years.	
	Weight per measured bushel.	Grain per acre.
	Lbs.	Bus.
Pearce's Improved Tree	64.8	23.0
Burlingame Medium	64.4	21.7
White Wonder	64.7	21.0
Schofield Pea	65.1	20.9
Medium or Navy	64.8	20.5
Marrowfat	64.4	18.8
Small White Field	64.3	18.0
Large White Haricots	58.4	15.8

The Pearce's Improved Tree bean, which was named by the late J. S. Pearce, of London, Ontario, and the seed of which was originally obtained from Pearce's Seed House, London, Ontario, occupies the highest place in yield of grain per acre and is surpassed by only one other variety in weight of grain per measured bushel. While an average of twenty-three bushels of beans per acre may not seem a very heavy yield, it must be understood that in some of the eleven years the yields were comparatively light, while in others the yields were very much greater. The small white beans of the Pearce's Improved Tree variety are of good quality. The Small White Field beans are surpassed in yield by the Pearce's Improved Tree variety by an average of exactly five bushels per acre per annum.

SOY BEANS.

The Soy beans, also known as Soja beans, are grown extensively in Japan, but they never received very general cultivation in America, except possibly in a few places in the United States. The crop furnishes exceedingly rich feed for farm stock and the plants may be cut and converted into silage or they may be allowed to ripen for the production of grain. Although there are a large number of varieties of Soy beans, the most of them require a long season to reach maturity and are quite unsuited for cultivation in Ontario. Although varieties have been obtained by the Agricultural College on various occasions, extending back for fully sixteen years, only two kinds have become at all prominent in our experimental work, viz., the Early Yellow and the Medium Green. The Early Yellow variety has proven to be one of the best for most parts of the Province as it yields very well and matures early. In the average results of growing the Early Yellow Soy beans at the College in each of fourteen years, we have obtained 14.8 or practically 15 bushels of threshed seed per acre.

In 1909, no less than sixteen varieties of Soy beans were grown in the Experimental department. A number of these were tested during the past year for the first time. The season was quite unfavorable for the growth of the Soy beans in Ontario, the heaviest yield per acre being produced by the Early Yellow variety, which was only a little over 13 bushels per acre. The Brown Soy beans gave 11 1-2 bushels, the Tsurunoko variety 10.7 bushels per acre, and the Chernie variety 6.5 bushels per acre. The other varieties produced even less yields than these and some of them furnished practically no seed.

VARIETIES OF FLAX.

In each of five years, experiments have been conducted at the College in the growing of flax from seed which was originally obtained from Ontario, Manitoba, Holland, and Russia. Six different quantities of seed per acre were used with each of the four varieties in each of the years referred to. The average results of the six plots of each lot of flax for the five years are as follows:

Varieties.	Average Results for 5 Years.		
	Average Weight per Measured Bushel.	Straw per Acre.	Grain per Acre.
	Lbs.	Tons.	Bus.
Manitoba	54.5	2.10	20.0
Common	54.4	2.00	18.9
Russian	54.9	1.93	17.3
Holland	54.5	1.97	15.0

It will be observed from the table that the flax seed obtained originally from Manitoba has been the one which has given very good results indeed in furnishing a strain of flax which has surpassed the next highest yielding strain or variety by 1.1 bushels per acre.

Besides the four kinds of flax just referred to, we had six other different lots under experiment in 1909, some of which were grown this year for the first time. Amongst these varieties, two were obtained from the Argentine Republic, one from Germany, one from Holland, and one from Minnesota. Of these different lots, the two from the Argentine Republic are the most promising.

VARIETIES OF MILLET GROWN FOR SEED.

Twenty-two different varieties of millet were grown in the Experimental department in 1909. Of this number seven were grown this year for the first time, and the others have been grown for two years or more. The following table gives the average yield of seed per acre of five years' experiments with each of seven different varieties:

Varieties.	Average results for 5 years.	
	Weight per measured bushel.	Grain per acre.
	Lbs.	Bus.
Siberian	54.6	51.6
Steel Trust	54.4	47.2
Hungarian	54.2	46.4
Holy Terror Gold Mine	51.5	44.7
Golden Wonder	52.7	38.2
German or Golden	53.9	36.4
Common	53.5	35.3

It will be seen that the Siberian variety of millet is a very heavy producer of grain, the yield for the five years being 51.6 bushels per acre per annum. Although 48 pounds is the standard weight for millet and the weight used in compiling these results, it will be seen that the average measured bushel of the Siberian millet weighed 54.6 pounds in the average of the five years' experiments. This is the heaviest weight per measured bushel of the seven varieties under test. The Hungarian Grass, which is well known throughout Ontario, gave an average yield of 5.2 bushels per acre less than the Siberian variety. The Common millet came at the bottom of the list with an average of 16.3 bushels of seed per acre less than that produced by the Siberian.

In the experiments of 1909, the greatest yields of seed per acre were produced by the Siberian, 38.1 bus.; the Hungarian Grass, 27.7 bus.; the Steel Trust, 25.8 bus.; the Holy Terror Gold Mine, 25.2 bus.; and the Common, 23.6 bus. Besides these, some of the selected strains did exceptionally well. One selected strain of the Siberian gave 41.6 bushels, which was the highest yield produced by any variety of millet in 1909.

HAIRY VETCHES FOR SEED PRODUCTION.

During recent years, the Hairy Vetches have been considerably advertised for use as a farm crop. They have yielded well as a fodder crop, have furnished a considerable amount of pasture, and have been very highly spoken of as a cover crop for fruit orchards. The seed, however, is nearly all imported from across the Atlantic and is very expensive, costing from five to six dollars per bushel, and for general purposes from one bushel to one and one-half bushels of seed per acre are required. In each of the past eight years, the Hairy Vetches have been sown in the autumn and allowed to ripen in the following year, in connection with our experimental work at the College. In the average results of eight years, we obtained five bushels of the seed per acre per annum, and the yield for 1909 was exactly five bushels per acre. The yield is somewhat irregular, as in 1903 it was 18.2 bushels and in 1908 it was less than one bushel per acre. We find, however, by continuous growing of the Hairy Vetches and by thus using Canadian grown seed, we get decidedly better results than we do from seed which has been freshly imported.

WINTER EMMER.

Although a number of varieties of spring emmer have been under experiment at the College, only one variety of winter emmer has been introduced and tested. The variety obtained is one which has given exceptionally good results in the experiment stations of some of the Western States, such as the one at Kansas. The Black Winter emmer has now been under experiment at Guelph for three years in succession, and the average results are as follows: Weight per measured bushel, 31.9 lbs.; yield of straw per acre, 1.5 tons; and yield of grain per acre, 2,055 lbs. In 1907, the Black Winter emmer produced 3,050 pounds of seed per acre, while in 1909, it gave only 1,388. The weather of the past season seemed to be quite unfavorable for the production of the winter emmer.

SUNFLOWERS FOR SEED.

While it is true that sunflowers are not grown to any great extent as an economic crop in Ontario, they are, nevertheless, large producers of seed, as will be seen from the results here presented. Seven varieties of sunflowers were tested in the Experimental department, and after five years all were discarded with the exception of three which have now been under experiment in each of the past eleven years. Taking the standard weight for sunflower seed as being 20 pounds per measured bushel, we have obtained a yield in the average of eleven years of 72.9 from the White Beauty, 72.8 from the Mammoth Russian, and 69.0 from the Black Giant. These are certainly large yields per acre, but probably not much larger than might be expected from growing sunflowers under fairly good Ontario conditions. For this experiment, the seed was planted about the same as corn. Some farmers harvest the heads of the sunflowers and run them through the cutting box along with corn when filling the silo, considering that the silage is improved in quality thereby, owing to the fact that the sunflower heads contain a large amount of oil. The seed is quite frequently used as feed for poultry.

SORGHUMS FOR SEED.

Although eighteen varieties of sorghum were grown in the Experimental department in 1909, only seven of these varieties matured seed. The greatest yields were produced by the Australian Broom Corn, 19.4; the Improved Evergreen Broom Corn, 15.5; and the Early Amber Sugar Cane, 11 bushels per acre. In the average of seven years, we have obtained yields per acre as follows: Early Japanese Broom Corn, 26.9 bus.; California Broom Corn, 25.6 bus.; and Improved Evergreen Broom Corn, 26 bus. per acre. Some of the varieties of sugar cane have given very good results indeed in some seasons, but the sugar canes are not as productive of seed at Guelph as they are on some of the lighter soils of Ontario, especially where the season is a little longer than it is at Guelph.

VARIETIES OF CORN FOR HUSKING.

Although the south-western part of Ontario, including particularly the counties of Essex, Kent, Elgin, Lambton, and Middlesex, is the section of the Province which produces a large amount of corn for husking, yet a number of the other counties, especially along Lake Erie and Lake Ontario, grow a considerable amount of corn for grain production as well as for fodder purposes.

One hundred and nineteen varieties of corn were grown in the Experimental department in 1909. A number of these did not mature the grain and had to be judged entirely from the standpoint of fodder production. As fourteen varieties of corn have been grown for grain production for five years in succession, the average results for the five year period are here presented for each of these fourteen varieties.

Varieties.	Color of Grain.	Average number of rows per ear.	Average results for 5 years.			
			Number of days until in full tassel.	Height of plants.	Percentage of cob.	Grain per acre.
				Ins.		Bus.
White Cap Yellow Dent....	Yellow...	14	82	101	21	66.1
Golden Dent...............	"	14	82	102	21	62.5
Wisconsin Little Dent......	"	14	77	93	23	62.5
University No. 13..........	"	16	83	101	24	61.8
Genesee Valley............	"	8	82	96	26	58.2
King Phillip...............	Red......	8	84	97	27	57.9
Eight-rowed Yellow	Yellow...	8	83	98	27	56.6
Earliest of All White Dent.	White	12	76	78	23	55.3
Red Blazed....	Red and Yellow	8	82	96	26	54.7
Compton's Early...........	Yellow ..	12	86	101	31	52.2
Canada Yellow............	"	8	85	96	28	50.9
Longfellow	"	8	86	97	27	49.6
Farmer's Friend...........	"	8	77	75	22	49.5
Salzer's North Dakota......	White ...	8	90	100	33	46.0

The White Cap Yellow Dent, which heads the list in yield of grain per acre, is a dent corn which is grown quite extensively in Ontario and particularly in the south-western part. It is much earlier in maturing than some of the large varieties of dent corn which are suitable for the southern or central states, but are not so valuable in Ontario. The White Cap Yellow Dent matures its seed very well on the warmer soils in southern Ontario and can be grown successfully farther north for fodder purposes. Of the varieties here mentioned in the list, five belong to the dent and the remainder to the flint class. Of the flint corns, the Genesee Valley has given the highest yield of grain per acre, yielding 58.2, while that of the Compton's Early, a well known Ontario variety, is exactly six bushels per acre less.

DIFFERENT STRAINS OF THE WHITE CAP YELLOW DENT CORN.

The White Cap Yellow Dent corn, which occupies the highest place in yield per acre of the varieties reported in the foregoing table, requires a more careful study. In order to get fuller information regarding different strains of this variety of corn which has been produced through selection by growers for a number of years in succession, seed was obtained from different sources in south-western Ontario. We regret that, through different causes, we have been compelled to drop several of these strains, but we still have three of them under competition for the last three years in succession. The following table gives the average results of the two tests conducted in each of the past three years in average height and total yield per acre, and also of the duplicate tests conducted in each of the three years for grain production.

County.	Grower.	Average results for 3 years.				
		Number of days until in full tassel.	Height.	Per centage of cob.	Total crop per acre.	Grain per acre.
			Ins.		Tons.	Bus.
Essex...........	J. Hammond.........	79	106	23	13.60	46.2
Middlesex..	E. M. Zavitz.........	79	112	28	15.17	44.5
Essex...........	J. Thomas...........	82	111	25	14.02	39 3

It is plainly seen that there is quite a marked difference in these three strains of White Cap Yellow Dent corn. The first two strains appear to be equal in maturity, but the first is a little higher in yield of grain per acre, and the second in production of total crop which would include the stalks and the leaves as well as the unhusked ears.

Varieties of Potatoes.

In 1909 there were 169,695 acres of potatoes in Ontario, resulting in a total production of 24,645,283 bushels, or an average of 145 bushels of potatoes per acre. This yield is 34 bushels per acre above the average yield of potatoes per acre in Ontario for the past 28 years.

Inquiries were made during the past year of farmers throughout Ontario regarding the varieties of potatoes which were most extensively grown in the different localities in the Province. The following gives the names and the order of varieties grown: 1. Rural New Yorker No. 2; 2. Empire State; 3. Carmen No. 1; 4. Beauty of Hebron; 5. Early Rose; 6. Delaware; 7. American Wonder; 8. White Elephant; 9. Early Ohio; and 10. Carmen No. 2. From inquiries made in each of the past three years, the Rural New Yorker No. 2 has been mentioned first and the Empire State second each year as the varieties which are the most extensively grown in Ontario. If the farmers in a locality would select for their general crop a variety which would be likely to produce large yields of salable potatoes of good quality, they would be almost sure to get a more ready market and obtain higher prices than by growing a large number of varieties and thus making it so difficult for buyers to secure carloads of uniform lots. In order to give potato growers in Ontario as valuable information as possible regarding the different varieties a large number are tested annually in the Experimental grounds at the College. In 1909 no less than 133 varieties were under test. The greater number of these have now been grown for, at least, five years in succession. Owing to a considerable amount of rot in some of the years, we have found it difficult to place the results in tabulated form so that the information would be accurate and not liable to be misunderstood. We are, however, obtaining valuable information regarding these varieties from year to year. Not only are the potatoes grown under very careful and uniform conditions and the yields determined, but many observations are made regarding the various characteristics of the different varieties, as for instance, in the average of three years tests, it was ascertained that some varieties were comparatively free from rot, viz., the Robertson's Champion, 3.1 per cent.; Stray Beauty, 3.2 per cent.; Early Pinkeye, 3.6 per cent.; and Holborn Abundance, 4.1 per cent.; while other varieties were very subject to the attacks of rot, as for instance, the White Pinkeye, 37.4 per cent.; Hanlan Beauty, 37.9 per cent.; Beauty of Hebron, 37.8 per cent.; and Montana Bluff, 41.8 per cent.

Both in connection with the results at the College and in the co-operative experiments over Ontario the following varieties have given excellent returns in yields of potatoes of good quality; of the late varieties, Empire State, American Wonder, and Rural New Yorker No. 2; of the medium ripening varieties; Burpee's Extra Early and Rose of the North; and of the early varieties; Early Eureka, Early Puritan, and Early Fortune. Of these varieties, particular attention is drawn to the Empire State as being a variety of potatoes which does exceptionally well in many localities throughout the Province. It is a white potato, oval in form, good for market purposes, the yield per acre is high, the percentage of small potatoes is low, and the table quality is excellent. The Empire State is a finer grained potato than the Rural New Yorker. When the last named variety is grown on sharp, warm soil, the quality is usually good, but when grown on rich loamy land the potatoes are apt to be large, coarse, and frequently hollow. The Early Eureka is also a white potato and amongst the very early varieties; this variety has proven to be one of the best yielders and one which is of very good quality and has a comparatively low percentage of small potatoes. The writer again wishes to call attention to the importance of the farmers confining their energies more particularly to the careful selection and the successful growing ot a few of the very best varieties instead of dividing their attention over such a great number of different kinds, some of which are of poor quality, sell for comparatively low prices and often give poor results.

Treatment for the Potato Beetle.

In order to test the influence of different treatments for the Potato Beetle, six lots of each of two varieties of potatoes were carefully selected and planted on separate plots, in each of five years. After the potatoes had made sufficient growth and the Potato Beetles (Bugs) had made their appearance, five plots of each variety were treated in different ways, to destroy the beetle, and one plot of each variety was left untreated, as a basis of comparison. The five treatments made in each of the years were as follows: (1) Paris Green and water, by using one pound of Paris Green and 96 gallons of water per acre; (2) Paris Green and plaster, by using one pound of Paris Green and 38 pounds of plaster per acre and applying the mixture to the potatoes in the dry condition; (3) Bug Death finish, which was applied dry at the rate of 20 pounds per acre; (4) Bug Death and water, by using on an average, 32 pounds of Bug Death and 96 gallons of water per acre; and (5) Bug Death used in the same proportion as No. 4, but in the dry condition. Three applications of each of the five treatments were made with each of the two varieties of potatoes. In the autumn, the potatoes from each of the twelve plots were dug and weighed. The average results of the experiment conducted for five years in succession, showing the yields in bushels per acre from each treatment, are as follows: Bug Death and water, 211.4; Bug Death dry, 203.5; Paris Green and water, 199.6; Paris Green and plaster, 183.3; Potato Bug Finish, 145.3; and untreated, 104.3.

In eight out of the ten tests made during the five years, those potatoes which were sprayed with Paris Green and water surpassed those which were dusted with Paris Green and plaster in yield of crop per acre. It will also be observed that the Bug Death and water gave better results than where the Bug Death was used in the dry condition. The Bug Death in solution gave considerably larger yields of potatoes per acre than the Paris Green and water. From the potatoes which were left untreated and on which the potato beetles were allowed to work unmolested, there was less than half the yield of potatoes, as compared with the crop produced from the treatment with Bug Death and water. The usual prices of these insecticides when bought in quantity are about as follows: Paris Green 20 cents; Bug Death, 7 cents; and Potato Bug Finish, 1 2-3 cents per pound. The cost, therefore, for the material used in the experiments conducted in the last five years was about as follows: Paris green and water, 60 cents; Paris green and plaster, 88 1-2 cents; Bug Death, $6.72; and Potato Bug Finish, $1.00 per acre.

In 1909, an experiment was conducted in the Experimental Department for the first time by the use of different proportions and different preparations of lead arsenate in comparison with Paris green for the prevention of the ravages of the potato beetle. As only one year's work has as yet been conducted with this treatment, it sufficeth to say that the greatest yields per acre were produced from the lead arsenate used in quantities of two and three pounds per acre with 40 gallons of water in each case. When the amount of lead arsenate per acre was three pounds, the yield was 217 bushels, and when it was two pounds the yield was 212 bushels per acre. The next highest yield of potatoes from the eleven different treatments was obtained from Paris green at the rate of 1 1-2 pounds per acre when used with 40 gallons of water, the yield being 202 bushels of potatoes per acre. The entire experiment was conducted in duplicate with each of two different varieties of potatoes and it is the intention to repeat the experiment in 1910 and we hope to obtain some valuable results from these investigations.

Bordeaux Mixture for the Potato Blight.

In each of the past three years, early, medium and late potatoes have been sprayed in different ways with two different solutions of the Bordeaux mixture. In reference to these two solutions the following quotations are made from the College Bulletin No. 154:

"The first thing to do in the manufacture of the Bordeaux mixture is to decide on some recommended formula. The formula which has long been advocated in Ontario is known as the 4-4-40 formula. It is as follows:

$CuSO_4$ (crystallized copper sulphate)	4 pounds.
CaO (quick lime)	4 "
Water	40 gallons.

"With good lime it only needs about one pound to act on all the copper; the excess given, three pounds, covers all danger which might arise from the use of a poor article. A large excess of lime is a disadvantage, it causes the Bordeaux mixture to exert a slow fungicidal action, it is apt to cause the machinery to clog and to cause an uneven application, and the particles of lime offering more resistance to rain, will cause the mixture to be more rapidly washed from the trees. It may be an advantage, however, in a very wet season, by causing the Bordeaux to retain its efficiency longer and by allowing less injury to be done to foliage. Orchardists are inclined to use a less proportion of lime, and the following formula is recommended:

$CuSO_4$ (crystallized copper sulphate)	6 pounds.
CaO (quick lime)	4 “
Water	40 gallons.

“As both copper sulphate and lime dissolve and slake, respectively, much quicker in hot water than cold, it is better to use heated water in order to save time. The very best lime obtainable is used, and if freshly burned, all the better. In slaking do not use an excess of water, but just enough to keep the lime moist. When the action is completed enough water is added to make a thin whitewash and then the whole is strained through coarse sacking to remove any lumps which would clog the nozzle of the spray pump. This done, enough water is added to make the volume up to one-half of what the final mixture will amount to. The copper sulphate solution is diluted to the same extent. The two are now mixed, the operation being best performed by two men, each with a bucket, one handling the lime and the other the copper sulphate. They are poured into the spray tank, two bucketsful at a time, until the whole is brought together. In this way a precipitate is obtained which will remain in suspension with only occasional agitation. If mixing is done before dilution, a very coarse precipitate is formed which settles rapidly to the bottom of the spray tank and requires almost constant stirring.

“If large quantities of spray mixture are going to be used, it is an excellent plan to make up “stock” solutions of the copper and lime. This can be done by dissolving, say, one pound of copper sulphate in each gallon of water and making up a barrel full of it. Each gallon of the solution taken then represents one pound of the bluestone. The salt can be conveniently dissolved by filling the barrel with water and then suspending it therein, enclosed in a canvas sack. The lime can be handled in the same way, being sure, of course, that the contents of the barrel are thoroughly stirred up before dipping out any portion. Keep the barrels covered when not in use.

“Before Bordeaux mixture is sprayed, it is absolutely necessary that all copper should be in the form of the sky-blue precipitate, *i.e.*, enough lime must be used to act on all the bluestone. Formulæ advocated by the experiment stations always contain enough lime to precipitate all the copper, but it may sometimes happen that such a very poor quality is used that there will be some of the sulphate left unchanged. There are several simple ways by which one can tell when enough lime is present. Those who are very familiar with the reaction which occurs can tell by the color of the precipitate, it having a greenish tinge when an insufficiency of lime is present instead of the deep sky-blue color. However, those who are not familiar with the process must use more decided tests. Three simple ones can be employed as follows:

“1. Take some of the clear solution which is left on top when the sediment settles and place in a white saucer. Add a few drops of a solution of potassium ferrocyanide to it. If a reddish-brown precipitate or coloration appears, more lime is needed.

“2. Take a portion of the clear fluid as before, and blow the breath gently over the surface. If a thin white pellicle or covering forms over the top, enough lime has been added.

“3. Take a bright piece of steel, such as a knife blade, and hold it in the mixture for a minute or more. If it becomes coated with copper more lime is required.

"Test number one is the most reliable and is the one recommended.

"In handling copper solutions use only wooden, brass or copper vessels; all other receptacles would be corroded and destroyed by them; besides, the fungicide itself would be injured.

"Copper compounds are poisonous and therefore should not be left lying around where children and animals can get at them."

In the experiments of the past three years one plot of each variety of potatoes was left unsprayed, one plot was sprayed on top of the vines 2 times; one 3 times; one 4 times; and one 5 times. Another plot was sprayed 3 times both on top and underneath the vines. The average of the three years results show that the two sprayings exerted but little influence on the crop, but there was an average increase in the yield per acre of 12 bushels from three sprayings, of 20 bushels from four sprayings, and of 25 bushels from five sprayings. When the potato vines were sprayed both on top and underneath the leaves there was an increase over the unsprayed of 22 bushels per acre or nearly as great as from the five sprayings which were made on the top of the vines.

Other Experiments with Potatoes.

Besides experiments here enumerated others were conducted in the treatment of the potatoes for scab, the planting of potatoes at different dates, etc., the results of which can be reported to better advantage at another time.

The Growing of Root Crops in Ontario.

That root culture lies at the basis of good husbandry is the candid opinion of many successful farmers of long experience. The root crop occupies an important place in the rotation, furnishes an excellent means for cleaning the land, prepares a splendid seed bed for a cereal crop, and supplies a large amount of succulent and palatable winter fodder which is rich in valuable food constituents which are easily digested by the animals. Roots assist greatly in the economical feeding of grain and coarse fodder, such as hay, straw, fodder corn and corn silage with which they are used. Root crops, in general, are much relished by all kinds of farm stock, but of special service are both swede and fall turnips for young stock and fattening animals, mangels for dairy cows, breeding ewes and hogs, carrots for horses, and sugar beets for cattle and hogs.

The growing of roots as a feed for farm stock has received much attention in many of the European countries. The root crop, however, has never been developed to the same extent in America, owing, no doubt, to the large areas devoted to corn in certain sections and to the adaptability of the soil to grain crops throughout a considerable part of both the United States and Canada. In the North-eastern States and in Ontario, Quebec and the Maritime Provinces, however, the field roots occupy an important place in the agricultural production. In some sections of America, the area devoted to the root crop is increasing from year to year. In order to illustrate this point, I would draw your attention to the increase in the area devoted to the mangel crop in the Province of Ontario. This increase can be observed from a study of the number of acres used for mangels in each of a number of the past years, as follows: 1882, 15,791; 1887, 17,924; 1892, 22,026; 1897, 41,175; 1901, 61,095; 1908, 67,937. During the same period of twenty-six years, the area devoted to turnips increased from 78,823 in 1882 to 120,920 acres in 1908. Within the last few years, however, the area used for turnips has been decreasing, and that for mangels increasing to a considerable extent, owing, no doubt, to the greater development of the dairy industry, in connection with which the mangels prove more serviceable than the turnips.

According to the reports of the Bureau of Industries for Ontario, we learn that the average yields per acre of our principal classes of field roots in Ontario have been as follows: Mangels (26 years), 460 bus.; Turnips (27 years), 429 bus.; Carrots (26 years), 346 bus. If we apply the best information which we have regarding the composition and the digestibility of the roots to the average yields here presented, we obtain the information embodied in the following table:

Classes.	Digestible matter per acre, lbs.		
	Dry Matter.	Protein.	Carbohydrates.
Mangels	2,484	304	1,546
Turnips	2,934	257	2,188
Carrots	2,284	166	1,702

These results show that while the turnips stand the highest in the amount of digestible dry matter and of digestible carbohydrates, mangels are at the top of the list in furnishing a large yield of digestible protein. It should be mentioned that the turnips, as here reported, include both the Swede and the soft varieties, but the latter are grown to a comparatively small extent in the Province of Ontario. The results here presented furnish some interesting information of a general character, but it should be kept in mind that in some parts of the country one class of roots will thrive admirably, and in another part of the country another class of roots will give more satisfactory returns.

Canadian Grown Root Seed.

Nearly all the seed of field roots, which is used in Ontario, is grown in Europe. From certain preliminary experiments and observations which we made previous to the year 1905, we obtained the impression that root seed produced in this country was likely to give very satisfactory crops. During the last three years, we have carried on systematic work in the production of seed of mangels, Swede turnips and carrots, and have been testing the seed so produced with seed of similar varieties which has been imported. In the autumn of each of the past four years, roots were selected and stored during the winter and were replanted in the spring. Some of each class of roots were pitted in the fall, some were stored in piles in the root cellar, and some were placed in sand. We have, however, found it difficult to pit a small quantity of roots and have the roots under the same conditions as those which have been pitted in large quantities. In the other methods of storing, we found we could obtain practically as good results when the roots were stored in loose piles in a cool cellar as when they were packed in sand, but there was less mould and sprout in the early spring from the latter than from the former method.

During the past few years we have obtained some very good results indeed from home grown root seed. The home grown mangel seed proved to be higher in germination and was more productive of roots than the seed which was imported.

The Ontario grown mangel seed surpassed the imported seed in yield of roots per acre in 1907, and also in 1908. In the autumn of 1907, the mangel seed did not ripen as evenly as in the year previous, some of the plants producing but little ripened seed. In the fall of 1908, however, all kinds of root seed matured very well.

In 1909, thirty-five lots of mangel seed were sown in the Experimental Department. Of these thirty-five lots, thirty were seed grown in Europe and five were seed grown in Ontario, four at the College and one at Waterloo. The first seeding took place on May 21st. Of each variety three rows, one chain in length were used. As the rows were 3⅓ links apart there was exactly 1-100 of an acre in each of the thirty-five plots. The seed was planted with great care by placing exactly four clusters of seed every ten inches in the row. There would, therefore, be 948 mangel clusters, that are usually called seeds, of each plot planted. After the mangel seed had made a growth, careful observations were made and it was seen that the European seed was much poorer in germination than that produced in Ontario. In order to study the germination of these different lots of mangels more carefully, the thirty-five varieties and strains were again planted on June 12th in exactly the same way except that the plots were made smaller in size. Again on June 25th all the different varieties and strains were sown in two sets. In one set the mangel clusters were sown separately and in the other, two clusters were planted in each place. These four different sets sown on the three separate dates gave an excellent opportunity for studying the germination of the mangel seeds under field conditions. As the germination of nearly all the European seed was so poor no results can be furnished regarding the comparative yields of the different varieties. The experiment is confined almost entirely to the germination of the seed which was carefully determined in each set which was sown. The results were very similar throughout the four separate tests and showed marked differences in the germination of the seed of the different varieties and also of the European seed as a whole as compared with that which was grown in Ontario. Of the thirty-five different varieties and strains under experiment the first, second, third, sixth, and ninth lots in germinating power were from Ontario grown seed, but all the rest were from seed obtained from seedsmen in Ontario, United States, Great Britain, and the Continent of Europe. The highest germination was from Ontario seed and amounted to 174 per cent., while the lowest was from imported seed and amounted to only 15 per cent. Each of the twenty-three varieties which gave less than 100 plants from 100 seed clusters was imported seed. The seed of the six varieties which gave the lowest germination of all was imported by Ontario seedsmen and purchased from them by the College in the spring of the present year. It seems to us that this is a very serious problem as the mangel crop is becoming of greater importance in Ontario from year to year. The poor germination of the mangel seed in 1909 may account for the fact that the yield was 46 bushels per acre less in that year than in the average of the past 28 years. As a large amount of seed is usually sown per acre on the farms in Ontario there must have been many blanks in 1909 to bring the average down to 410 bushels per acre. It would certainly be wise for Ontario farmers to carefully test their mangel seed before they sow their crop in the spring of 1910.

Yellow Leviathan Variety of Mangels.

The variety of mangels known as the Yellow Leviathan has given exceptionally good results in the experiments at the College and also in the co-operative experiments conducted throughout Ontario. The Yellow Leviathan has been reported as standing the highest in the average yield per acre of several years' tests at the College. Owing to its high yielding qualities and also from the fact that the Yellow Leviathan is a compact, yellow, intermediate mangel of good form and easily handled, it has been tested more extensively during the past two years.

In the spring of 1909, seed of the Yellow Leviathan mangel was obtained from all those seedsmen in Ontario, who advertised this variety in their catalogue, copies of which were furnished us at time of ordering the seed in the spring of the year. As we also used this variety for seed production at the College we were enabled to conduct an experiment with different lots of home grown seed along with those obtained from the Ontario seedsmen. Four different tests were made with these eight lots of Yellow Leviathan mangel seed in the past season. Number one lot was seed produced by mangels which had been stored in sand; number two lot was seed from mangels which had been stored in a loose heap in the cellar; number three lot was seed from a single plant; and number four was also seed produced by a single plant. The following table gives the total number of plants produced from 1,172 mangel seed clusters, and also the average percentage of germination in the field of the four sets which were planted on three separate dates:

Varieties.	Number of Plants Produced from 1,172 Seed Clusters Planted.	Percentage of Germination in the Field. Average of 4 sets. 3 Dates of Planting.
Yellow Leviathan (O. A. C. grown seed, lot 4)	1,776	152
Yellow Leviathan (O. A. C. grown seed, lot 2)	1,663	142
Yellow Leviathan (O. A. C. grown seed lot 1)	1,384	118
Yellow Leviathan (O. A. C. grown seed, lot 3)	1,287	110
Yellow Leviathan (Steele-Briggs)	992	85
Yellow Leviathan (Ferry)	990	84
Yellow Leviathan (Hewer)	796	68
Yellow Leviathan (Rennie)	484	41

It will be seen that there is a marked difference in the germination of the Yellow Leviathan mangel seed obtained from different sources. The germination of the Ontario grown seed was better than that of the European seed in every instance.

VARIETIES OF SUGAR BEETS.

There are two different classes of sugar beets grown in Ontario, one for the production of feed for farm stock and the other for the production of sugar. With the first object in view, the varieties mostly grown have roots of good size which grow considerably out of the ground and contain about 10 per cent. of sugar. When the object is sugar production those varieties are grown whose roots grow almost entirely under the ground and which contain on an average about 15 per cent. of sugar. The roots of the varieties grown for sugar production are also considerably smaller than those grown for feeding on the farm.

Twelve varieties of sugar beets, which include the two classes previously referred to, have been grown in the Experimental department in each of the past five years. All the varieties were grown in rows 21 inches apart and the roots were thinned to seven inches apart in the rows. The following table gives the average results in tons of roots per acre and also gives the percentage of sugar as determined in the Chemical department at the College:

Varieties.	Length in inches.		Percentage of Sugar.	Yield per acre.
	Above Ground.	Under Ground.		
				Tons.
Bruce's Giant White Feeding	3.9	4.5	8.1	26.3
Rennie's Tankard Cream	3.2	4.4	*8.6	22.6
Steele-Briggs' Royal Giant	2.9	5.1	10.2	22.0
Simmers' Imperial Giant Half Sugar	2.9	5.2	†10.6	21.9
Bruce's Giant Rose Feeding	3.0	5.0	13.0	20.8
Rennie's Giant Sugar	2.8	5.1	†10.3	20.4
Rennie's Danish Improved	2.7	5.2	11.1	20.1
White Silesian	.9	6.0	13.7	18.5
Red Top	1.4	5.9	11.2	18.0
Champion	.8	6.4	15.7	17.4
Improved Imperial	.6	5.8	16.8	15.8
Rubensamen (Type A)	.5	5.9	*17.3	14.0

*Average for 4 years. † Average for 3 years,

The Bruce's Giant White Feeding has given decidedly the largest average yield of roots per acre in the report here presented. It will be noticed that the sugar content, however, is the lowest of all the varieties here tabulated; in fact, as a general rule, as the yield per acre decreases the sugar content increases, although there are a few slight exceptions to this rule.

Of the twenty-three varieties of sugar beets grown in 1909, the greatest yields per acre were produced by the Rennie's Jumbo, 21.1 tons; Tankard Cream, 19.9 tons; Bruce's Giant White Feeding, 19.0 tons; Giant Half Sugar White, 17.9; Steele-Briggs' Giant White, 17.8; Royal Giant, 17.4; Keith's Prize Winning Half Sugar, 16.9; Bruce's Giant Rose Feeding, 16.8; Rennie's Giant Sugar, 16.6.

VARIETIES OF SWEDE TURNIPS.

Twenty-three varieties of swede turnips were grown in the Experimental department at the College in 1909. The yields per acre were rather light, the largest yields in tons per acre being as follows: Carter's Invicta, 17.1; Keepwell, 17.0; Cropwell, 16.9; Improved Purple Top Yellow, 16.7; and Rennie's Prize Purple Top, 16.4.

Five varieties of swede turnips have been grown for seven years and the following are the average yields per acre in tons of roots: Hall's Westbury, 20.3; Sutton's Magnum Bonum, 19.0; Kangaroo, 18.4; Hartley's Bronze Top, 18.2; and Buckbee's Giant, 18.1.

VARIETIES OF FALL TURNIPS.

In 1909, eleven varieties of fall turnips were grown at the College. The yields were considerably lower than usual. The five varieties which gave the highest yields in tons per acre in 1909 were as follows: Sutton's Imperial Green Globe, 18.7; Sutton's Purple Top Mammoth, 17.5; Sutton's Centenary Green Top Hybrid, 16.1; Red Top White Globe, 15.9; and Cow Horn, 15.4.

The three leading varieties of fall turnips have now been under test in each of eight years. The average results for the eight year period in yield of roots per acre are: 25.7 tons for the Red Top White Globe; 20.8 tons for the Early American Purple Top; and 19.5 tons for the Cow Horn.

VARIETIES OF FIELD CARROTS.

Sixteen varieties of field carrots were grown at the College in 1909. Of this number eleven varieties have been grown for five years in succession. The average results in length of roots and in tons of roots per acre for each of the eleven varieties for the five year period are as follows:

Varieties.	Color.	Length of roots.	Yield per acre.
		Ins.	Tons.
Steele's Improved Short White	White	8.4	28.0
Mastodon White Intermediate	"	8.7	27.4
Simmer's Improved Giant Short White	"	8 4	27.0
Bruce's Mammoth Intermediate Smooth White	"	8.3	26.9
Carter's Hundred Ton	"	8.2	26.0
Large White Vosges	"	6.6	23.3
Rubicon Half Long Red	Red	5.9	22.9
Large White Belgian	White	11.0	22.7
Carter's Gate Post Orange Long	Yellow	8.8	21.5
Sutton's Magnum Bonum	Orange Red	8.8	20.6
Kirsche Carrot	Yellow	7.0	18.4

It is interesting to note that all the leading varieties of carrots are those of the white intermediate type, and that each of these varieties produced an average of several tons of roots per acre more than the Large White Belgian variety, which used to be grown extensively. Not only do the short white varieties give a greater yield per acre, but, owing to their compact form, they are very much easier harvested and more convenient for handling.

VARIETIES OF KOHL RABI.

Kohl Rabi resembles cabbage in its root and Swede turnips in its leaf growth. The valuable part grows about three inches above ground in the form of a bulb. The kohl rabi, when used for domestic purposes, is prepared in much the same way as Swede turnip. When grown as a food for stock it is harvested and stored somewhat similar to mangels and turnips, although the crop is sometimes pastured off in the field. The kohl rabi is grown only to a limited extent in Ontario. Four varieties were tested in the Experimental department in 1909, the greatest yield being produced by the Earliest Erfurt, which gave thirteen tons of roots per acre. Three varieties of kohl rabi have now been grown under test at the College in each of eight years and the average yields of roots per acre is as follows: Earliest Erfurt, 18.6 tons; Early White Vienna, 18.3 tons; and Goliath Purple, 15.4 tons.

VARIETIES OF PARSNIPS.

Although parsnips have not been grown in Ontario to any great extent as a food for stock, enquiries have been received and some articles have been written regarding the value of this class of roots as a producer of food for domestic animals. In order to obtain more information on the growing of parsnips with the object of feeding the same to farm stock, experiments with a few varieties have been conducted at the College during recent years. The most of these have now been dropped and only two were included in the tests in 1909. As these two varieties have been grown in each of five years we here present the average yield of roots per acre for the five year period: New Ideal Hollow Crown, 10.2 tons; and Sutton's Cattle, 9.7 tons.

VARIETIES OF CORN FOR GREEN FODDER, DRY FODDER, OR THE SILO.

The corn crop, although not occupying as large an area as the oat, wheat, or barley crops in Ontario, nevertheless occupies an exceedingly important place in the agriculture of the Province, especially in the south-western part. The area devoted to the fodder corns in Ontario was 200,354 acres in 1907, 233,753 acres in 1908, and 288,346 acres in 1909, according to the latest report of the Bureau of Industries for the Province of Ontario. The average total yield of green corn per acre in 1909 was 11.7 tons, and that for the past eighteen years 11.45 tons per acre. The fodder corns are largely grown in those counties of Ontario in which dairying is developed to a large extent, although many of the other counties are now devoting a considerable amount of attention to the fodder corns. There are scarcely any parts of Ontario in which some one or other variety of corn will not thrive unless it is in the northern districts. Even beyond the limits where it was thought that corn could not be grown, certain varieties have been cultivated and even ripened with a considerable amount of satisfaction. It is of the greatest importance, however, to secure those varieties which are particularly suitable to the localities in which they are to be grown. In order to ascertain this information, it is important for each farmer to do a certain amount of experimental work for himself. Before doing so, however, he will find very great assistance from results of experiments which we have conducted at the College with a large number of varieties, where not only the total yield per acre but also the yield of ears, the stage of maturity, etc., are taken into consideration. The variety experiments conducted at this station should serve as a general guide to the farmers in most parts of Ontario, indicating to them the kinds which are likely to be suitable for their respective localities. It is indeed impossible to mention any one variety of corn which is most suitable for Ontario as a whole. The requirements of the various localities are so very different that it seems necessary to give the results of a large number of varieties which can be studied by individual farmers in order that the greatest value from the experiments can be obtained. We are, therefore, presenting the average of five years' experiments of each of sixty-eight varieties of corn which are grown under uniform conditions. The varieties in the list are arranged according to the total yield of green corn per acre. For these experiments, the corn was usually planted during the last ten days of May, and it was harvested about the middle of September. Immediately after the crop was cut, the ears were husked, weighed, counted and examined. The stage of maturity of the corn was indicated by the condition of the grain at the time it was harvested. The seven terms which were used to describe the ripening of the corn at the time of husking were as follows: water, early milk, milk, late milk, dough, firm dough, and ripe. In each of the five years, experiments were conducted in duplicate, and we, therefore, have ten distinct experiments conducted with all of these varieties within the five year period. The average results of the five years' experiments are given in the accompanying table:

VARIETIES OF CORN.

Varieties.	Description of Varieties.		Average results of Five Years Experiments, 1905-09.					
	Class of Corn and Color of Grain.	Average number of Rows per Ear. 5 years.	Condition of Grain when Harvested.	Number of Days until in Full Tassel.	Height of Plants.	Weight per Ear.	Yield per Acre.	
							Husked Ears.	Total Crop Green.
					inches.	ounces.	tons.	tons.
1. Henderson's Eureka	Yellow Dent	16–18	Early Milk.	103	127	8 93	3.81	25.07
2. Pedrick Perfected Golden Beauty	Yellow Dent	12–14	Early Milk.	104	126	6.31	2.72	25.01
3. New Century Wonder	Flour	12	Water	110	117	2.98	1.04	23 48
4. 100 Day Bristol	Yellow Dent	14	Milk	101	122	7.64	3.68	23.10
5. Landreth's Large White Flint	White Flint	12	Early Milk.	103	124	6.17	3.04	22.36
6 Pride of Indiana	White Dent.	16–18	Early Milk	104	124	6.85	3.02	21.70
7. Darke County Mammoth	Yellow Dent	18	Milk	97	121	9.80	4.56	21 70
8. Lenocner's Homestead	Colored Dent	16	Milk	95	115	9.14	4.21	20.73
9. Mastadon Dent	Yellow Dent.	18	Milk	98	119	9.07	4.07	20.72
10. Marblehead Mammoth	Sweet	12–14	Milk	95	93	8.06	4.16	20.51
11. Salzer's North Dakota	White Flint.	8	Firm Dough.	90	100	6.95	4.22	20.22
12. Cloud's Early Yellow	Yellow Dent.	18–20	Milk	100	119	8.83	3.71	20.10
13. Early Butler	Yellow Dent.	14–16	Milk	93	117	8.46	4.31	19.85
14. Rennie's Early Giant White Dent	White Dent.	14–16	Milk	97	110	7.90	3.82	19.76
15. Reid's Yellow Dent	Yellow Dent.	16–18	Late Milk	97	116	8.40	3 86	19.56
16. Hoopengardner's Very Early Yellow Dent	Yellow Dent.	16	Late Milk	90	109	10.62	5.18	19.53
17 Top Notch	Sweet	12–14	Milk	96	94	6.90	3.83	19.47
18. Smith's White Cap Yellow Dent (Duke)	Yellow Dent.	16	Dough	89	112	9.82	4.71	19.35
19. Triple Income	Yellow Dent.	14–18	Milk	94	112	8.86	4.26	19.28
20. Improved Leaming	Yellow Dent.	16–18	Milk	96	115	8.70	3.92	19.18
21. King Phillip (Duke)	Colored Flint	8	Firm Dough.	87	103	7.81	3.99	19 10
22. Mammoth Cuban	Yellow Dent.	16–18	Late Milk	93	114	8 32	3.97	18.88
23. Mammoth Southern Sweet	White Dent.	14	Milk	100	115	7.17	3.10	18.84
24 Rennie's Improved Leaming	Yellow Dent.	16–18	Milk	99	115	8.06	3.35	18.82
25. Wisconsin's Earliest White Dent	White Dent.	14–16	Milk	98	109	8.06	3.59	18.80
26. Compton's Early (Duke)	Yellow Flint	12	Firm Dough.	85	104	9.50	4.83	18.58
27. Late Mammoth	Sweet	12–14	Milk	100	95	7.43	3.35	18.52
28. Stowell's Evergreen	Sweet	14–16	Milk	97	94	7.07	3.36	18.46
29. Mayfield Earliest	White Dent.	14–16	Late Milk	91	109	9.46	4.38	18.31
30. Longfellow	Yellow Flint.	8	Firm Dough.	86	97	6.40	3 65	18.24
31 Quail Track	Colored Flint	12–14	Dough	87	108	9.51	4.50	18.04
32. Iowa Silver Mine	White Dent.	14–16	Milk	98	112	8.08	3.64	17.90
33. Compton's Early	Yellow Flint	12	Firm Dough.	86	101	8.65	4.20	17.86

34. Salzer's North Dakota (Duke)	White Flint.	8	Firm Dough.	86	95	7.88	4.09	17.67
35. Eight-rowed Yellow (Duke.)	Yellow Flint	8	Firm Dough.	83	98	7.77	4.16	17.58
36. Country Gentleman	Sweet	....	Milk	96	91	5.15	3.48	17.51
37. King Phillip	Colored Flint	8	Firm Dough.	84	97	6.68	3.98	17.49
38. Early White Cap Yellow Dent	Yellow Dent.	16	Late Milk	93	111	8.10	3.67	17.40
39. Canada Yellow	Yellow Flint	8	Firm Dough.	85	96	7.20	3.76	16.88
40. Longfellow (Duke)	Yellow Flint	8	Ripe	81	97	6.82	3.80	16.86
41. Weigle's Leaming (Duke)	Yellow Dent.	14–16	Dough	86	109	9.63	4.59	16.83
42 Red Blazed Yellow Flint (Duke)	Colored Flint	8	Ripe	80	100	8.50	4.28	16.71
43 Bailey (Duke)	Yellow Dent.	14–16	Dough	87	105	8.96	4.43	16.70
44. Sterling White Dent	White Dent.	14	Dough	85	103	9.98	4.66	16.67
45 Genesee Valley	Yellow Flint	8	Ripe	82	96	7.47	3.90	16.58
46. Voorhee's Sweet	Sweet	12	Late Milk	93	84	5.91	4.16	16.56
47. Hickox Sweet	Sweet	12–14	Milk	94	91	7.58	3.45	16.55
48. Leaming (Duke)	Yellow Dent.	16–18	Dough	90	109	9.54	4.10	16.03
49. Red Blazed	Colored Flint	8	Ripe	82	96	7.52	3.87	15.57
50. University No. 13	Yellow Dent.	16	Firm Dough.	83	101	8.68	4.45	15.25
51. White Cap Yellow Dent (Hammond)	Yellow Dent.	14	Firm Dough.	82	101	8.53	4.24	15.24
52. Wessel	Yellow Flint	8	Ripe	82	99	7.50	3.81	15.19
53. Crosby	Sweet	12	Late Milk	85	82	5.89	3.79	14.27
54. Golden Dent (Gould)	Yellow Dent.	14	Firm Dough.	82	102	8.27	3.99	14.02
55. Howling Mob	Sweet	12–14	Dough	81	76	8.61	4.78	13.74
56. Perry's Hybrid	Sweet	12	Dough	83	79	7.91	4.18	13.54
57. Kendal's Early Giant	Sweet	12	Late Milk	84	76	6.88	3.99	13.34
58. Mammoth White Cory	Sweet	8	Dough	78	71	5.99	3.79	12.46
59. Ford's Early	Sweet	8	Dough	78	72	5.97	3.85	12.33
60. Wisconsin Little Dent	Yellow Dent.	14	Ripe	77	93	8.23	3.95	11.66
61. Premo	Sweet	10	Dough	79	67	4.87	3.68	11.64
62. Farmer's Friend	Yellow Flint	8	Ripe	77	75	6.31	3.08	11.53
63. Ringleader	Sweet	10	Dough	75	66	6.02	3.76	10.95
64. Golden Bantam	Sweet	8	Dough	78	62	3.89	3.01	9.78
65. Earliest of All	White Dent.	12	Ripe	76	78	7.22	3.35	9.24
66. Independence	Sweet	8	Dough	77	66	3.97	2.89	8.96
67. Malakhoff	Sweet	10	Firm Dough	72	55	2.59	2.69	8.23
68. Peep O' Day	Sweet	8–10	Dough	72	54	3.43	2.48	5.85

The accompanying table certainly shows great variations in the results from different varieties of corn grown under similar conditions. In the average height, the different varieties range from 54 to 127 inches, the number of days from planting until the corn is in full tassel from 72 to 104, in average weight per ear from 2.6 to 10.6 ounces, in yield of husked ears per acre from 2.5 to 5.2 tons, and in total crop from 5.6 to 25.1 tons per acre.

It will be seen that, as a general rule, the large varieties are late and the small varieties are early in reaching maturity. This general rule, however, does not apply in the same way to all varieties, as, for instance, the Henderson's Eureka with 25 tons per acre is as early as the Pride of Indiana which yielded 21.7 tons per acre, the Salzer's North Dakota with a yield of 20.2 tons of green crop was as early as the Golden Dent with a yield of 14 tons per acre, and Smith's White Cap Yellow Dent with a yield of 19.4 tons was as early as the Independence with a yield of only nine tons per acre.

Although it will be seen from the results here presented that many of the varieties of corn named do not ripen at Guelph, yet these results furnish some excellent information in comparing various varieties. As some of the late varieties are advertised considerably over Ontario, a study of the foregoing table will enable farmers to ascertain for themselves whether these varieties are likely to meet their requirements. When examining the results of experiments conducted at Guelph with the corn crop, it should be remembered that these experiments were carried on in a locality which is eleven hundred feet above the sea level and eight hundred and fifty feet above Lake Ontario, and in latitude north 43 degrees 38 minutes, also that Guelph is about thirty-eight miles inland from the lakes. Keeping these considerations in view, a large amount of valuable information can be gleaned from the figures here presented.

In the spring of each year, the Ontario Agricultural and Experimental Union distributes throughout Ontario seed for three experiments with corn—one with fodder corns, one with varieties of corn for husking, and one with sweet corns for table use. Uusually three varieties are distributed for each of these experiments, which enables the farmers to ascertain for themselves which of the most promising varieties from the experiments conducted at Guelph will produce the most satisfactory results from their individual farms.

VARIETIES OF SORGHUM FOR FODDER.

Under the term sorghum, we include a variety of crops such as Sugar Cane, Broom Corn, Kaffir Corn, Millo Maize, Jerusalem Corn, etc. Some of these are used considerably for the production of syrup, others for furnishing material for the manufacture of brooms and whisks, and others for the production of food for culinary purposes. All of these classes, however, are more or less valuable for the production of fodder for farm stock. The sorghums are grown quite extensively in some of the States of the American Union. They thrive well in a comparatively dry, hot climate where the corn makes a slow growth. At the College, none of the varieties have been used for silage, and only one variety, the Early Amber Sugar Cane, has been used extensively for pasture. For the production of fodder, however, eighteen varieties were under experiment in 1909. Of this number, ten have been grown under similar conditions in the Experimental Department in each of eleven years. The seed was planted each year in sections by placing five seeds in a place and allowing 3⅓ links (26 2-5 inches) between the different plantings. When the sorghum was about five inches in height, some of the plants were removed, thus allowing only three plants to remain in each place. The sorghum was cultivated in about the same way as corn. The following gives the height, the yield of heads, and the total yield of green crop per acre of each of the ten varieties and for the average of eleven years:

Varieties.	Height.		Yield of Heads per Acre.		Total Yield per Acre.	
	1909.	Average 11 years, 1899-09.	1909.	Average 11 years, 1899-09.	1909.	Average 11 years 1899-09.
	Ins.	Ins.	Tons.	Tons.	Tons.	Tons.
Orange Sugar Cane	70	92	.3	.4	9.6	18.6
Early Minnesota Sugar Cane	90	103	.5	.8	10.3	17.7
Early Amber Sugar Cane	87	94	1.0	.9	7.7	16.2
Kaffir Corn	55	64	.3	.5	7.0	12.5
California Golden Broom Corn	103	109	.9	1.6	6.2	11.5
Improved Evergreen Broom Corn	95	108	1.1	1.4	4.9	9.8
Early Japanese Broom Corn	101	105	1.1	1.5	6.1	9.7
Yellow Millo Maize	56	69	.5	.7	5.8	9.2
Brown Dhoura Corn	58	68	.5	.8	6.5	8.4
Jerusalem Corn	55	62	.4	.7	2.5	6.3

The reader is referred to the earlier part of this report for the results from the different varieties of sorghum in the production of seed. The Broom corns took the lead in seed production in the experiments at the College, but the Sugar Canes occupied the highest place in yield of green crop per acre. It will be seen that in the average of the eleven year period, the Orange Sugar Cane produced 18.6 tons, the Early Minnesota Sugar Cane 17.7 tons, and the Early Amber Sugar Cane 16.2 tons of green crop per acre. The Kaffir Corn, regarding which we sometimes read sensational articles in the newspapers, has given an average yield per acre of only about two-thirds that of the Orange Sugar Cane. The Jerusalem Corn, regarding which the writer received an advertising sheet about one yard in length before first securing this variety for experimental purposes, occupies the lowest place of all the sorghums in yield of green fodder per acre, the tonnage being only about one-third as great as that of the Orange Sugar Cane.

VARIETIES OF SUNFLOWERS FOR FODDER.

Seven varieties of sunflowers were grown in the Experimental department for several years in succession, and three of these varieties have now been grown for fourteen years. For the production of seed, the reader is referred to an earlier portion of this report. The three varieties which have been grown for fourteen years have given average yields in tons per acre, of heads, and of the whole crop, as follows: Black Giant, 6 and 20.4; Mammoth Russian, 5.6 and 16.5; and White Beauty, 5.7 and 16. The results of the White Beauty, however, are for twelve instead of fourteen years. The average results for the fourteen years also show the diameter of the heads and the height of the plants to be as follows: Black Giant, 7.1 inches and 101 inches; Mammoth Russian, 7.3 inches and 94 inches, and Black Beauty, 7.4 inches and 87 inches. The heads of the sunflowers have been recommended by some authorities as valuable for cutting and mixing with corn when filling the silo as the quality of the silage is improved thereby.

VARIETIES OF MILLET FOR GREEN FODDER AND FOR HAY.

Although the millets are grown by some farmers for the production of seed, the main object in growing millet in Ontario is for the production of fodder. It is probably used more as a catch crop than as a regular crop in the ordinary rotation. It sometimes occurs that, owing to unfavorable weather conditions, farmers are unable to plant their corn until it is too late to insure satisfactory results. When this occurs, millet can frequently be sown at a much later date with excellent results. The spring of the past year has furnished an example when millets can, in many instances, be sown to excellent advantage. Although seventeen varieties of millet were grown in 1909, only nine of these varieties have been under experiment in each of the past five years. The following table gives the results for 1909 and for the average of five years in height, yield of green crop, and yield of hay per acre:

Varieties.	Height.		Per Acre.			
			Green Fodder.		Hay.	
	1909.	Average 5 years. 1905-09.	1909.	Average 5 years. 1905-09.	1909.	Average 5 years. 1905-09.
	In.	In.	Tons.	Tons.	Tons.	Tons.
Japanese Panicle	40	44	9.4	10.5	3.8	4.4
Holy Terror Gold Mine	34	33	10.0	9.4	4.2	3.8
Golden Wonder	36	36	9.9	9.5	4.2	3.8
Steel Trust	35	34	9.9	8.9	4.1	3.5
Hungarian Grass	32	33	8.0	8.4	3.7	3.2
Siberian	30	34	9.2	8.1	3.7	3.0
Common	33	33	8.3	7.7	3.5	2.9
German or Golden	30	33	8.0	7.6	3.4	2.8
Japanese Barnyard	36	39	6.1	8.1	2.4	2.7

It will be seen that a variety of the Japanese millet occupies the highest place in average yield of both green fodder and hay per acre of all the varieties under test. This variety, which has given such excellent results as a fodder millet, is known as the Japanese Panicle. Not only has it given good results at Guelph, but it has also made a high record in the co-operative experiments over Ontario for several years in succession. It grows to a good height, stands remarkably well, has a good leaf development, and is relished by farm stock. As it is a little later in maturing than some of the other varieties, it is not quite as suitable for growing in the northern sections of Ontario. In the greater part of the settled portions of the Province, however, it is proving to be a most valuable variety. There has evidently been a great misunderstanding amongst the seedsmen as to the different varieties of Japanese millet, as some of them in advertising the Japanese millet have illustrated the Japanese Panicle variety and have described the Japanese Barnyard Grass. These two varieties are entirely different. The writer has been informed that, in many instances, the farmers have written expecting to receive Japanese Panicle millet which has a dark, reddish-brown, shiny seed, and they obtained the Barnyard Grass which is much lighter in color and has not the glossy appearance of the Japanese Panicle variety. It is wise always in ordering millet from the seedsmen, not only to mention definitely the variety required, but also to ask for a sample before ordering in bulk, and thus be sure that the seed is true of the variety which it is desirable to secure.

DATES OF SOWING MILLET.

For four years in succession an experiment has been conducted with the object of gleaning information regarding the best time to sow millet seed for the production of green fodder and of hay. For this experiment the Japanese Panicle, the Japanese Barnyard, and the Hungarian Grass were the varieties used. The seeding took place on the second of May in 1906 and in 1907, on the 4th of May in 1908, and the 15th of May in 1909, and the succeeding seedings every half month until, in all, seven sowings were made, except in 1909, when only six seedings were used. As it is difficult to make hay out of the crop produced from the late seedings, especially in the case of the Japanese Panicle variety, the results have been worked up in the green crop. The following table gives the average yield of green crop per acre produced in 1906, 1907, 1908, and 1909 of each of the varieties from the different dates of seeding and also for the average of the three varieties:

Dates of Seeding.	Average yield of green crop per acre.			
	Japanese Panicle	Japanese Barnyard.	Hungarian Grass.	Average 3 varieties.
	Tons.	Tons.	Tons.	Tons.
May 15th	8.62	6.88	7.01	7.50
June 1st	10.28	8.74	7.50	8.84
June 16th	10.28	8.18	7.39	8.62
July 1st	8.26	7.65	7.83	7.91
July 15th	8.06	6.10	7.08	7.08
Aug. 1st	....	....	3.06	....

From the results here presented it will be seen that the greatest yield of green fodder per acre was produced from the seedings of June 1st and June 16th for the Japanese Panicle variety; the seeding of June 1st for the Japanese Barnyard variety; and the seeding of July 1st for the Hungarian Grass. In the average results of the three varieties, the greatest yield per acre was obtained from sowing on the 1st of June. An examination of the results of these experiments seems to indicate that there is a possibility of sowing these varieties of millets at either too early or too late a date, even in the growing season, if the most satisfactory results are to be obtained. The results here presented also show that millet will stand comparatively late seeding and is of value as a crop to sow on land which has been prepared for corn or roots which could not be planted in the proper season owing to wet weather or some other cause.

VARIETIES OF RAPE, KALE, CABBAGE, ETC., AS FARM CROPS.

Although field rape has been grown considerably in different parts of the Province, few farmers are familiar with other varieties of rape or of similar crops for feed production. It is, therefore, interesting to make a careful study of the different kinds of rape, kale, cow cabbage, mustard, etc., in order to understand the comparative results of these crops when grown in Ontario under Ontario conditions. Some of these are grown somewhat extensively in Great Britain. No less than 29 varieties belonging to this class of crops were grown under test at the College in 1909. The crops were all sown in rows 3⅓ links (26 2-5 inches) apart. Each plot was exactly 1-100 of an acre in size consisting of three rows each four rods in length. The seed was sown at the rate of about two pounds per acre, and the plants of each variety were thinned to two inches apart in the rows. The land between the rows was cultivated occasionally throughout the early part of the growing season. The seeding took place on June 21st, which is about a week later than the usual time of seeding. When the crops had reached their best condition for feeding in the autumn, each variety was cut with a scythe and weighed in the green condition.

This class of crop is usually fed to sheep or hogs or young cattle. In England the cabbage seed is frequently sown in the garden or in hot beds and the young plants are transplanted in the field at sufficient distances apart to produce large heads. This, however, requires a great amount of labor, which is an important item in connection with agriculture in Ontario at the present time. In this experiment the different varieties of cabbage have been treated in exactly the same way as the different varieties of rape and kale. The heads of the cabbage, therefore, have been quite small, the growth being principally leaf and stem. The quality of these crops, however, appears to be very good. The following table gives the results of this experiment for 1909 and also for the average of five years.

It will be seen that the Dwarf Essex Rape, which is the best known variety of this class in Ontario, has been surpassed in average yield of green crop per acre by fully six tons per annum. Of the five highest yielding varieties, four of them are cabbage. The Sutton's Earliest Drumhead Cabbage gave the highest yield of crop per acre in 1909, and also in the average results for five years.

Varieties.	Height.		Green Fodder, per acre.	
	1909.	Average 5 years 1905–09.	1909.	Average 5 years 1905–09.
	Ins.	Ins.	Tons.	Tons.
Sutton's Earliest Drumhead Cabbage	18	19	23.7	27.7
Sutton's Giant Drumhead Cabbage	19	21	21.2	26.0
Thousand Headed Kale	26	36	16.2	26.0
Sutton's Earliest Sheepfold Cabbage	17	18	19.7	24.6
Sutton's Best of All Savoy Cabbage	16	18	19.1	22.5
Large Seeded Umbrella Rape	21	28	11.3	22.1
Large Seeded Common Rape	23	30	12.7	22.1
Marrow Collards	20	24	17.7	21.9
Dwarf Victoria Rape	21	29	14.5	21.9
Dwarf Essex Rape	22	30	14.1	21.4
Buckbee's Wonderful Dwarf Bonanza Rape	24	29	16.3	20.9
Purple Sprouting Broccoli	25	32	14.5	20.8
Hardy Curled Kale	21	28	13.6	20.5
Large Seeded White Flowering Rape	23	30	14.2	20.5
Jersey Kale	24	32	14.1	20.4
Cabbage Leafed Rape	24	32	12.4	20.1
Brussel's Sprouts	21	25	11.2	16.4
New Chinese Mustard	65	62	11.2	15.3
Southern Giant Curled Mustard	58	54	10.6	15.2
Bloomsdale Large Leafed Mustard	62	60	11.3	14.9
White Mustard	61	57	12.1	13.7
Creole Mustard	60	54	11.9	12.9
Brown Mustard	63	63	7.6	11.3
German Rape	7	18	3.8	5.2

Besides the varieties enumerated in the table, five other varieties have been under experiment for less than five years. Of these, the one known as the World

Beater cabbage has given the greatest yield in the average of two years, being 26.6 tons. This was followed by the Simmer's Matchless Flat Dutch cabbage, with an average for the two years of 25.4 tons per acre, and this, by the Simmer's Early Brunswick cabbage, with an average of 23.5 tons per acre for the two years.

LEGUMINOUS CROPS FOR GREEN FODDER.

In 1909, twenty different varieties of Soy beans, Cow peas, vetches and grass peas were grown for the production of fodder. As most of the varieties in each of these classes require a longer season for growth than that furnished in Ontario, many of them do not prove successful. The greatest yields in tons per acre in 1909 were produced by the following varieties: Harbara Soy beans, 9.2 tons; Grass peas, 8.0 tons; Amherst Soy beans, 7.6 tons; Shingto Soy beans, 7.5 tons; Cloud Soy beans, 7.4 tons; Hairy Vetches, 6.8 tons; Tsurunoko Soy beans, 6.5 tons; Chernie Soy beans, 6.1; and Nuttall Soy beans, 6.1 tons.

Six varieties of leguminous crops have now been grown for five years in succession for the production of green fodder. The greatest yields have been obtained from the Grass peas, 6.9 tons; Ito San Soy beans, 6.8 tons; Early Yellow Soy beans, 5.5 tons; and Wonderful Cow peas, 5.2 tons per acre.

ALFALFA OR LUCERNE.

A bulletin on Alfalfa or Lucerne was issued in the spring of 1908. The bulletin referred to results of experiments conducted at the Ontario Agricultural College and referred to the reports of co-operative experiments in Alfalfa growing throughout Ontario. Copies of this bulletin can be obtained by writing to the Department of Agriculture, Toronto.

The following table gives the yields per acre of the different cuttings for both green fodder and cured hay of the alfalfa as produced in the Experimental Department at the College in each of 12 years:

Years.	Green Crop.					Hay.				
	First Cutting.	Second Cutting.	Third Cutting.	Fourth Cutting.	Total.	First Cutting.	Second Cutting.	Third Cutting.	Fourth Cutting.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons
1896....	9.96	6.47	4.06	2.06	22.55	3.08	1.91	1.29	.65	6.93
1897....	12.04	5.61	4.43	....	22.08	3.59	1.56	1 23	....	6 38
1898....	9.71	5.85	2.64	....	18.20	2.30	1.75	.63	... ...	4.68
1900....	11.93	6.00	1.60	....	19.53	2.33	1.47	.80	....	4.60
1901....	9.70	2.20	7.49	....	19.39	2.03	1.00	1.50	....	4 53
1902....	13.35	8 69	2.96	....	25.00	2.50	2.02	.54	....	5.06
1903....	13.10	8.53	2.75	....	24.38	2.50	2.09	.67	....	5.25
1904....	12.45	9.35	4.00	....	25.80	3.40	2.50	1.08	....	6.98
1906....	9.78	6.60	4.85	....	21.23	2.55	1.13	.58	....	4.26
1907....	14.55	3.95	....	....	18.50	2.95	1.05	....	....	4.00
1908....	9.70	6.75	3.73	. ....	20.18	2.50	1.15	.75	....	4.40
1909....	8.68	4 56	.84	....	14.08	2.52	1.40	.14	....	4.06
Average 12 years	11.25	6.21	3.28	.17	20.91	2.69	1.59	77	.05	5.10

The figures here presented are the results of experiments which took place in different parts of the experimental grounds, mostly in comparative tests, with different varieties of clover. In every case the crop was sown in the spring of the year at the rate of 18 or 20 pounds of Alfalfa seed per acre and usually with a grain crop, such as, barley sown at the rate of one bushel per acre.

In each of ten years the alfalfa gave exactly three cuttings, but in 1907 it produced only two, while in 1896 it gave four cuttings in the one season. It will be remembered, however, that the spring of 1896 opened up very early and that of 1907 exceptionally late.

The average results for the twelve years show the annual yield of alfalfa to be 20.9 tons of green crop and 5.1 tons of hay per acre.

Different forms and strains of alfalfa are known principally by the country in which they have been grown for a number of years. Though this is very indefinite, there appears to be different strains of alfalfa produced in Turkestan, the value of which varies considerably. Much has been claimed in the United States and in Canada for the Turkestan alfalfa. The results of the experiments which have been conducted at Guelph within the past twelve years show that the so-called Turkestan alfalfa obtained through the seed trade of the United States and Canada has displayed no perceptible advantages over the common variety obtainable in this Province. Wishing to obtain fuller information regarding the best sources of purchasing alfalfa seed of the best quality for use in Ontario, we secured for experimental purposes samples of seed grown in different parts of the world. Some of these were obtained through the kindness and co-operation of the Department of Agriculture at Washington, and some were obtained direct by the College. In the spring of 1905, 28 plots were sown with the alfalfa seed obtained from different sources. From each of the plots three cuttings for hay were made in 1906; one cutting for hay and one for seed in 1907; three cuttings for hay in 1908; and three cuttings for hay in 1909. The following table gives the average dates of the first appearance of bloom and the average yield per acre of the green crop and of hay for the three years, 1906, 1908, and 1909:

Source of Seed.	Dates of First Bloom. Average 3 years.	Total yield per acre. The cuttings in each of the years 1906, 1908, 1909.	
		Green Crop.	Hay.
	June.	Tons.	Tons.
Texas, Panhandle	17	18.7	4.9
Nebraska	15	17.6	4.5
Turkestan, Khiva	18	16.7	4.2
Nebraska	21	16.1	4.1
Turkestan Samarkand	19	16.2	4.1
New York	14	16.6	4.0
Chinese Empire, Sairam	19	15.6	4.0
Russia, Simbirsk	16	16.2	3.9
Northern Montana	15	15.4	3.8
Utah, irrigated	18	14.4	3.8
Northern Montana	17	13.7	3.6
Southern Montana	18	13.6	3.6
Texas, Sherman	15	14.0	3.4
France, Poitou	15	14.8	3.4
Ontario, O.A.C. seed, 1904	17	14.0	3.3
Germany	13	13.3	3.2
Colorado	19	13.0	3.2
Kansas	21	11.2	3.0
Ontario, O.A.C. seed. 1903	18	11.9	3.0
Utah	16	11.2	2.9
United States, first quality commercial seed	14	11.9	2.8
Russia, Kharkoff	14	11.6	2.7
Turkestan, through Wm. Rennie, seedsman, Toronto	20	10.8	2.7
Italy	15	11.2	2.5
Turkestan, through Currie Bros., seedsmen, Milwaukee	15	10.3	2.4
France, Provence	18	9.5	2.2
Arabia	18	2.4	.6
Peru	....	.0	.0

A casual glance at the table shows that the results obtained from the seed of the Turkestan Alfalfa, which was obtained in America, were decidedly lower than those obtained from the Turkestan Alfalfa obtained from Turkestan.

Sowing Alfalfa.

Alfalfa should be very carefully tested on many farms throughout Ontario. Its large yields of nutritious feed for farm stock, its perennial character of growth, and its beneficial influence on the soil, are all features which commend it very highly for those farms on which it can be grown successfully.

There are different ways of laying down a plot or a field to Alfalfa, and we would suggest the following method as one which is likely to give very excellent results: Select land having a clean, mellow, fertile surface soil overlying a deeply drained subsoil having no acidity. Use large, plump seed, free from impurities and strong in germinating power. Inoculate the seed with the proper kind of bacteria, providing Alfalfa has not been grown successfully on the land in recent years. As early in the spring as the land is dry enough and warm enough to be worked to good advantage, make a suitable seed-bed and immediately sow about twenty pounds of Alfalfa seed per acre from the grass seed box placed in front of the grain drill, and about one bushel of spring wheat or of barley per acre from the tubes of the drill. Smooth the land with a light harrow or with a weeder, and if it is very loose and rather dry, also roll it and again go over it with the harrow or the weeder. As soon as ripe, cut the grain and avoid leaving it on the land longer than necessary. Give the alfalfa plants every opportunity to get a good start in the autumn in preparation for the winter. If for hay, cut each crop of alfalfa in the folowing year as soon as it starts to bloom. In curing, try to retain as many of the leaves on the stems as possible, and to protect the crop from rain. Never cut or pasture alfalfa sufficiently close to the ground to remove the crowns of the roots, and thus injure or possibly kill the plants. If these directions are followed, the alfalfa may be expected to produce large and valuable crops for a number of years without re-seeding.

Annual Pasture Crops.

In experiments extending over several years, we have found that the following mixture has given very good results indeed for sowing in the spring of the year for furnishing pasture for cattle in the same season in which the seed was sown:

Oats (1½ bushels)	51 lbs. per acre.
Early Amber Sugar Cane	30 lbs. per acre.
Common Red Clover Seed	7 lbs. per acre.
Total	88 lbs. per acre.

This mixture in each of the past four years has furnished pasture which has been greatly relished by animals and has furnished a sufficient amount of pasture material to more than supply one animal per acre.

We have on each occasion obtained a good catch of red clover which formed an excellent matting on the ground in the autumn and was ready to come through the winter and furnish a crop of clover in the following season. There was probably no experiment at the College in which the thousands of excursionists who went over the experimental grounds the past summer took a greater interest.

We trust that the results of the various experiments here presented may prove of real value in the improvement of the agriculture of our Province.

Respectfully submitted,

C. A. ZAVITZ.

PART XVI.

THE LECTURER IN ECONOMICS.

To the President of the Ontario Agricultural College:

SIR,—I have the honour to submit herewith the report of the department of Economics for 1909.

The courses of lectures as outlined in the College Calendar, have been delivered to Second and Third Year students. It is very gratifying to me to be able to report also that one lecture period per week with Fourth Year has been arranged for, to run throughout the Fall and Winter Terms. This affords an opportunity to devote special attention to certain subjects, hitherto receiving treatment only in a casual way. Although it is felt that in such a subject as Economics much more time might be advantageously spent with students about to undertake work of a public nature, yet I feel grateful for the recognition the work of this department has received, and hopefully look forward to at least two periods per week with the Senior Class. I need hardly state that the wider the student's experience the greater is his interest in the public and social questions of the day; hence the progress achieved by a student is greatly accelerated as he approaches his final term at College. In view of this I would most earnestly request your consideration of an additional period with this class.

As mentioned in my last report, the Junior Class are required to make simple economic investigations into various subjects in different parts of Canada and the United States. This year most of the researches have been made in connection with Agricultural Co-operation and organization and has proved a most attractive field. Up to the present the reports have not been completed, but evidence is not lacking of excellent work being done by the majority of the class. A glance at the following list of subjects will give some idea of the nature of the questions chosen by members of the Junior and Senior Classes for investigation:

A study of how commodities are marketed as the present time—Manufactured Goods as compared with Agricultural Products.

Education and Co-operation—Is co-operation the result of education, or is education the result of co-operation?

Forms of organization of co-operative societies—Joint stock, no share company, etc.

Difficulties of organization.

Co-operative Credit Associations.

Possibilities of Co-operative Production and Distribution.

The Status of Agricultural Co-operation in other countries, e.g., Denmark, France, Ireland, Germany, Scotland.

Agricultural Co-operation in Canada as compared with above countries.

Canada's agricultural resources as compared with those of above countries.

Problems peculiar to the marketing of special products such as grain, hogs, eggs, butter and cheese, fruit, etc.

How to form a Co-operative Society.

How to incorporate a Society; and advantages of incorporation.

These are a few of the subjects receiving consideration during the present year.

ENGLISH.

The work which has been assigned to me in this department is English Composition with Second and Third Years, and Public Speaking with Second Year.

The practice in regard to Composition is to assign a theme each week, upon which an essay is written and handed in for examination. Marks are assigned, errors pointed out and suggestions offered each week and the papers handed back at the close of the lecture period. The essays are, for the most part, written out of class, but occasionally an impromptu paragraph is called for in the regular lecture period. In this way students are induced to think rapidly and logically, and to say what they mean in the neatest and most effective manner. The work of examining these products, however, is closely akin to slavery, especially when the number goes on increasing as is inevitable with the progress of the institution. This year my attempt has been to read and examine, in the two classes, one hundred and fifty essays per week.

PUBLIC SPEAKING. Public speaking is taken with Second Year during the Winter Term. Here again the largeness of the class reduces individual attention to the minimum, but the aim has been to afford the student an opportunity to become used to the platform; cool and collected before an audience; and capable of translating his ideas into intelligible and acceptable English. No attempt is made to endow a student with the "gift of the gab," and very little is done with gesticulation and oratory in the commonly understood sense of the terms. A student, however, after taking the course, should be capable of appearing before any audience and doing justice to his knowledge of the subject under consideration.

In all, four afternoon periods per week are devoted to this subject.

Respectfully submitted,

H. H. LEDREW.

PART XVII.

THE DIRECTOR OF HOME ECONOMICS.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith the sixth annual report of the work of the Home Economics Department, for the year 1909.

THE YEAR'S WORK.

The Home Economics department has been almost wholly occupied with the instruction of students. Eighty-three per cent. of the students were in the non-professional classes, and we may hope they will put to practical use in their own homes the knowledge gained. There have been few changes in the courses, but the staff has suffered several changes. The outstanding feature of the year is the number of applications which had to be refused for want of residence accommodation. This works well in connection with professional courses, since it permits the selection of the best material, but against the interests of the rural student to whom the residence life is of special value.

THE DIFFERENT COURSES.

The Normal Course in Domestic Science.

Thirteen entered the two-year course in September, 1907. Twelve passed into the senior class in September, 1908; nine passed the final examinations, and have received the Macdonald Institute Teachers' Certificate in Domestic Science. Twenty entered the course in 1908, nineteen passed on to the senior class in September, and two obliged to drop out of last year's class rejoined this year's class, making twenty-one now in attendance. There were many applications for entrance this year, but the class was limited to sixteen who entered last September.

Five experienced teachers entered the one-year course in September, 1908; all passed the final examinations in June, 1909, and have received the Macdonald Institute Teachers' Certificate in Domestic Science. The large number coming forward from the junior class taxed our resources and we were able to accept but four of the many applicants for entrance in September. The limitation of the present junior class will remedy this difficulty next year.

Hitherto applications for admission to the two-year course have been accepted as they came until the class filled. In future, the rule applied to one-year applications of accepting none until June, will apply to both classes. The large number offered will enable us to choose the strongest teacher-material, and reject the weak, and should greatly improve the quality of our teacher-graduates.

The Guelph Public and High Schools sent us four classes throughout the year, for practice-teaching.

2. *The Housekeeper Course.*

Three entered the course in September, 1907, and two more in January, 1908; all passed to the senior class in September, 1908, and two more entered by virtue of Homemaker work; six passed the final examinations of June, 1909, and have received the Macdonald Institute Housekeeper Certificate. Eight entered the course in September, 1908, six passed on to the senior class, September, 1909, and are now in attendance. Ten entered the junior class last September.

As this course becomes better known we shall have the usual difficulty of more applicants than accommodation. The mature woman whose household experience has been good, whose health is sound and who is still mentally alert, is the right kind of material for this work, and the demand for trained women is greater than the supply. All but one of last year's graduates are settled at work with salaries ranging from $35 to $50 per month in addition to living. As living usually means attractive and comfortable quarters, and the social position is good, it will be seen that our housekeeper graduates have prospects which compare favorably with those of our teacher graduates.

Housekeeper graduates who have completed six months' satisfactory housekeeping in an institution are entitled to the Macdonald Institute Professional Housekeeper Certificate. It was issued for the first time this year, when seven graduates of various years received this recognition of their professional standing.

3. *The Homemaker Course.*

Thirty-seven entered this class in September, 1907; twenty-two passed the final examinations last June and have received the Macdonald Institute Homemaker diploma. Thirty were admitted to the course last September and are now in attendance.

There was a time when the interest of this class in the actual cooking and sewing classes was much greater than in the science or reasons at the bottom of the practical operations. We are glad to note the gradual deepening of interest in all the household questions, and we look forward to the day when the Homemaker class will demand two years' work and as many if not more science classes than the teachers' class.

It is encouraging to note that nearly sixty per cent. of the last class completed the course, a decided advance on the previous year when but forty-four per cent. went through.

4. *The Short Course in Domestic Science.*

The flexibility of this course is very satisfactory. It gives a fixed course in cookery, laundry, house-practice, foods, sanitation and home nursing, but permits variation in the sewing and electives, according to the students' ability and interests. There were in attendance this year in the Winter Term, January to March 48; Spring Term, April to June, 38; Autumn Term, September to December, 30; making a total of 116.

5. *The Short Course in Sewing.*

The interest in this course is growing rapidly. It appeals to the girl who wishes to learn to do the simpler dress-making of the average family. Hitherto she has been obliged to serve her time in a regular dressmaker's shop, where she must spend long days and do a great deal of unnecessary work; and where she picks up what she can about cutting and fitting, and receives little specific teaching on the subject. The dressmaker cannot be blamed since her business is to produce dresses. Our course centres round the girl and cultivates her ability to choose and plan and cut and fit her material with due regard to suitability and color harmony. In consequence of this concentration of the student's attention, the average girl learns more in three months than the shop apprentice learns in twice the time. In addition she has the protection of life in residence, and the valuable training of living with many other girls.

There were eight in attendance during the Spring Term, April to June; in the Autumn Term, eleven, September to December. These classes must be kept small owing to the constant need of individual supervision as they demand a great deal of the chief sewing instructor's time. During the Winter Term the pressure of other classes is too great to permit of a sewing course.

The two classes of the year made very attractive exhibits of their work, which were surprising to many who had not followed the progress of the various gowns, hats, embroidery and color-work pieces.

6. *The Summer Course in Domestic Science.*

With the hope of making this course more popular, the work was limited to cookery, laundry and home nursing. This made it possible to give a really good series of lessons in each, and did away with the unpopular sewing of the previous years. Eleven, the same number as last year, entered the course and were enthusiastic students.

Optional Courses.

These students are not taken into residence, and no special classes are formed for them, which limits the attendance to townspeople who find room in different classes after the regular students are settled. The Winter Term had 5, the Spring Term 5, and the Autumn Term 3, chiefly in the sewing classes.

Student Workers.

Nine girls have this year been able to pay for a Short Course in Domestic Science by giving us four months' service in Macdonald Hall. A tenth is doing a full year of stock-room work, preparatory to a year of Housekeeper training.

SPECIAL LECTURES, MEETINGS, ETC.

The special marketing lectures were carried out by College professors as follows: Fruits, Prof. Hutt; Vegetables, Mr. Crow; Canned Food, Prof. Edwards; Cereals, Prof. Harcourt, and Meat Cuts, Prof. Day.

This department was represented at the Ontario Educational Association last April by myself.

A party of Senior Housekeepers spent two days in Toronto last spring, studying the methods and equipment of certain large laundry and restaurant plants. They considered the time well spent if only for the lesson of economy through efficient management and well-placed machinery.

We have no fresh research work to report, owing to the time of the staff being fully occupied with the work of class-instruction.

WOMEN'S INSTITUTE WORK.

This department has always taken a great interest in the Women's Institute, and has frequently invited the members to send to us for help along our line of work. Recently we realized that members living far from towns had few resources in the way of books and magazines dealing directly with home interests and household affairs, and that many members would be glad to borrow material from us to help them in the preparation of papers for the monthly meetings. We decided to make an effort to place the resources of our books, magazines and pamphlets at their service. Accordingly, a general intimation of our willingness to lend our material was made to the Women's Institute Convention of 1908, and Mr. Putnam distributed last winter, through his Women's Institute lecturers, the following special circular:

ONTARIO DEPARTMENT OF AGRICULTURE.

WOMEN'S INSTITUTE BRANCH.

We are pleased to be able to announce to Institute officers and members that *Macdonald Institute, O.A.C., Guelph, Ont.*, is prepared to render assistance to those who wish information to enable them to prepare papers or addresses for presentation at meetings of the Institute.

By reason of the special training of the Macdonald Institute staff, and the resources of various departments of the College, the Home Economics Department is able to answer many questions and solve many difficulties now perplexing the housekeepers of this country, and will be pleased to try to answer such questions as the members of the Women's Institute care to send in.

A good reference library of books on Home Economics subjects is being gathered, and a collection of pamphlets and magazine articles is being made. These books, pamphlets and articles Macdonald Institute is willing to lend to Women's Institute members.

In order to prevent disappointment and delay, the borrower should observe the following directions:

1. Address your request to Home Economics Department, Macdonald Institute, O.A.C., Guelph, Ont.

2. State the subject of the paper or speech you have undertaken to provide, and the date for which it is wanted.

3. As it is seldom possible to answer questions or requests by return mail, and some require several days to satisfy, please send them in at least a fortnight before the answer is wanted.

4. When returning papers or pamphlets, please do not roll or fold them, but return them in flat package as received.

For information as to Methods of Organization, Rules and Regulations governing the Institutes, Suggestions as to ways and means of making the Institute meetings most interesting and profitable, financing the organization, etc., apply to

Geo. A. Putnam,
Supt. of Women's Institutes,
Parliament Buildings,
Toronto, Ont.

May, 1909.

Our books are catalogued and easy to send out, but book post is expensive, especially when one chapter of a heavy book frequently satisfies a question, or when one book does not cover the ground. We therefore turned to our rapidly growing collection of unbound literature and began to put it in shape for mailing. This necessitated tearing up the magazines to separate the articles worth preserving, the putting of each article or pamphlet into a numbered folder, and the reading of each in order to make an intelligible reference for the card catalogue. No special person was available, the work had to be done in odd hours, and progress has not been very rapid, but we have now about 1,500 filed away and another 1,000 well under way. They are classified as follows:

Home.
House. Plans, furnishings, decoration, sanitation, care and cleaning.
Food. Composition, general information, preparation.
Dietetics. General information, dietary standards, diet for different ages.
Health.
Social.
Education.
Economics of the Home.
Dress and Textiles.
Arts and Crafts.
Miscellaneous.

We have set up a simple circulating system, and find it an easy matter to find, send out and keep track of our catalogued material.

We had this year about 360 requests for material, on all sorts of subjects from recipes to ethics, from housecleaning to home nursing, and were able to send articles, pamphlets or books to 250 women. Of the remainder about a third came in the summer when there was no one who could attend to the work, 25 per cent. wanted material already out on loan, and the rest gave subjects not covered by our collection.

Many times the other departments have helped greatly by answering questions much more satisfactorily than we could. A notable instance of this was Dr. Bethune's samples of the insect which develops into the buffalo moth, and his careful directions for preventive measures, which went to one Women's Institute desirous of studying that subject.

Cataloguing is laborious, but this has been well worth doing if only as the basis of a collection valuable for our own students. The members of the Women's Institute have proved appreciative, and we believe the effort has been justified.

We wish, however, to extend the same welcome to questions from any woman who reads the above and thinks we can help her with any household problem.

STAFF CHANGES.

Miss Givin was finally obliged to give up teaching on account of ill health and resigned last March. Her place has been filled by Miss Jean Roddick, of Cobourg, a graduate of the Ontario Normal School of Domestic Science and Art, who has been on the staff of the Toronto Public School domestic science teachers.

Miss Ferguson leaves our staff at the end of this year to take up the domestic science work of the Berlin Manual Training High School, for the sake of the more varied and wider experience it affords. Her place will be filled by Miss Mary McLennan, a 1907 graduate of our own, who comes to us from dietitian work in the University of Pennsylvania Hospital, Philadelphia.

Miss Nealina Macmillan, supervisor of house-practice, leaves our staff at the end of this year, to take a housekeeper position in Macdonald College, Quebec. Her place will be filled by Miss Eliza Maddock, a 1909 graduate of our Housekeeper Course.

Macdonald Institute owes much to these teachers. Miss Givin was one of the members of the original staff and a large measure of the success of our teacher graduates is due to her efficient teaching; Miss Ferguson has done most effective Short Course work in her three years of service; and Miss Macmillan has so satisfactorily developed the house-practice that she has won the students' full respect for the value of the work.

EQUIPMENT, ETC.

Parents look upon the residence life as a valuable part of the education given here, and besides very few are willing to let their daughters live alone in down town boarding houses. On opening day last September we had fifty girls on our waiting list who would have come had they been able to board in. Every room in Macdonald Hall for next term has been taken since September 20th, we have twenty-four waiting for possible vacancies, and a considerable list of those who have declined to go on the waiting list. Very little additional expense will enable Macdonald Institute to handle additional classes, but it is useless to provide for them until the Hall can accommodate them. We may of course plan for the unification and improvement of our present courses, but it is idle to look for further expansion of our work until the residence difficulty is overcome.

I beg to acknowledge the efficient work of the other members of the Home Economics staff, and the valuable help given this department by many of the other departments.

Respectfully submitted,

M. U. WATSON.

PART XVIII.

THE PROFESSOR OF MECHANICS AND MANUAL TRAINING.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith the sixth annual report of the department of Farm Mechanics and Manual Training for 1909.

In addition to the regular work of this department, an additional course was instituted in Elementary Industrial Arts. This course was arranged by the Department of Education for the instruction of a selected number of teachers-in-training at the Normal Schools who had successfully passed the April examinations for Second Class Certificates and had fulfilled the other conditions prescribed by the Department of Education. The object of the course was to prepare a body of teachers for organizing and carrying out that Department's scheme of Elementary Industrial training in the urban schools of the Province, in centres which are unable to provide adequately equipped Manual Training departments. A brief outline of the course will be found in subsequent pages of this report.

To carry out the instruction projected in the Department of Education's circular, 13th February, 1909, entailed more work than could be undertaken by the permanent staff of this department, and temporary assistance had to be procured. We were fortunate in securing the services of Mrs. Walter Misener, Wellandport, and Mr. John A. Stiles, B.Sc., of the School of Practical Science, Toronto. In arranging instruction in Farm Mechanics for Second Year students during the Fall Term, we were again fortunate in securing the valuable services of Mr. R. W. Wade, B.S.A., Lecturer in Animal Husbandry. The large increase in the number of the Second Year students makes it difficult to arrange a rota of instruction in the three subjects of Farm Mechanics, Forging and Machine shop practice. We are obliged to divide each division of the year into three sections, each section containing a larger number than can be accommodated in either forge room or machine shop, the surplus being drafted into Machinery Hall. This makes the class very unwieldy, and too large for one man to handle, and renders the instruction very unsatisfactory, as the majority of students get only two lessons in forging and in vice work, a large percentage of them receiving only one lesson in each of the last named subjects. It is therefore very desirable that adequate provision be made in the Forge room and in the Machine shop to meet the increased demand upon the resources of this department. Basing our calculations upon the number of students at present in attendance, it would be necessary to instal in the Forge room five additional forges, and five more vises in the Machine room.

WINTER TERM. There were in attendance 129 First Year students receiving instruction in Woodworking and Mechanical Drawing. Thirty-nine lady students attend lectures in Color and Household Decoration, and ten took the course in Simple Carpentry.

The Spring Term opened with 45 students attending the course in Color Work and Household Decoration, together with 40 Normal School graduate teachers for Elementary Industrial Arts.

The course of study for the Normal students was as follows:

PEDAGOGICS, ETC.

(15 hours.)

(*a*) Manual Training as a factor in general education; (*b*) Sketch of the various systems, Russian, Swedish, Sloyd, etc.; (*c*) Progress of Manual Training in Canada; (*d*) Methods of teaching, plans of courses and lessons; organization, equipment, plans, estimates of cost, etc.; (*e*) Lectures dealing with industrial questions and the means of improving our opportunities; (*f*) Visits to local industries and consideration of industrial development of Canada.

DRAWING, APPLIED ART AND DESIGN.

(120 hours.)

Emphasis was given the practical application of drawing to the industries.

Drawing: (*a*) The use of squares, triangles, and instruments; (*b*) Plane geometry, practical problems, lines, angles and polygons; (*c*) Construction and use of plain scales; (*d*) Orthographic projections of solids—three or more views; (*e*) Cutting and oblique planes and sections; (*f*) Isometric projection; (*g*) Working drawing; (*h*) Machine drawing; (*i*) Tracing—blue printing.

Applied Art and Design: Observation of these in local manufactures and in common decorated objects such as wallpaper, carpets, furniture, cloths, jewellery, iron and brasswork; practical applications in everything undertaken in the constructive work.

WOODWORKING.

(100 hours.)

(*a*) Bench exercises in making articles requiring joints, mortises, fastenings with dowels, pins, cleats, keys, wedges, glue, screws and nails, etc.; (*b*) Calculation of the quantity of lumber necessary for making the articles and estimation of cost; (*c*) Tools (5 lessons), their construction, care, use and sharpening; (*d*) Analysis of the action of cutting tools, cutting angles, etc.

Finishing (2 lessons): (*a*) Staining, fuming, filling, shellacing; (*b*) Oil and wax polishing; (*c*) Pigments, priming, coats; (*d*) Oils, driers, brushes; (*e*) Painting and glazing.

Forestry and Lumber (4 lessons): (*a*) Forest Preservation—propagation, time of cutting, pruning; (*b*) Trees—classes, structure, growth, seasoning, shrinking and warping; (*c*) Properties of woods—durability, elasticity, stiffness, density; (*d*) Varieties of common woods—peculiarities of each, color, grain, identification; (*e*) Defects in lumber—resin, pockets, knots, shakes; (*f*) Decay and its causes—preservation; (*g*) Lumbering—Transportation, sawmills, grading widths.

Constructive Work.

(65 hours.)

(*a*) Cardboard work—thin and thick boards (20 hours); (*b*) Modelling—clay, sand and papier mache (10 hours); (*c*) Simple bookbinding (10 hours); (*d*) Simple metal work (15 hours); (*e*) Knife work such as can be carried on in the ordinary class room at the school desk (10 hours).

Time Table.

Showing allotment of time for each subject:

——	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
9 to 10.30	Drawing.	Drawing.	Drawing.	Drawing.	Drawing.
10.30 to 12.......	Constructive Work.	Constructive Work.	Constructive Work.	Drawing.	Pedagogics, Methods, Planning, Lessons, etc.
1.30 to 4.30.......	Woodwork.	Woodwork	Woodwork.	Visits to local industries.	Woodwork.

The Department of Education granted a certificate in Elementary Industrial Arts to those students who completed the course satisfactorily and gave evidence of ability to carry on this work successfully in the schools. The daily record of this class work under the observation of the instructors, as well as the results obtained at the final examinations, were taken into consideration in awarding the certificate. The successful candidates were also granted the Three Months' Course Certificate issued by the College. The work covered in this term is accepted *pro tanto* towards securing a Specialist's Certificate in Manual Training.

The work was supplemented by visits to local and outside industries, so that the students might become acquainted, as far as possible, with the various processes, organizations and conditions governing industrial pursuits. The class visited the Raymond Sewing and Cream Separator Factories, Tolton's Agricultural Implement Works, the Bell Piano and Organ Factory, the Taylor-Forbes Factory, and the Paper Box Factory, all of Guelph; the Woollen Mills, Hespeler, and the factories of Galt. At all of these places we were courteously received, and arrangements were made by the firms to take the students through the factory in small groups, thus giving every opportunity to thoroughly examine the product and machinery of the plant, which proved both interesting and instructive. We extend to the managements of these industries our hearty thanks for every consideration and kindness shown us.

While this class was in session it was visited by the following officials of the Department of Education: Inspectors R. H. Cowley, A. H. Leake and Dr. Merchant; also Principal Scott, of the Normal School, Toronto. Appended is a list of those who received certificates:

Normal School.	Name.	Post Office.	County.
London	Abbott, Lina E.	Lucan	Middlesex.
Ottawa	Casselman, Geo. K.	Williamsburg	Dundas.
Stratford	Cluff, Mollie E	Clinton	Huron.
London	Copp, Edna	Clinton	Huron.
Ottawa	Curtin, Agnes	Brockville	Leeds.
London	Daniels, Elma E.	Alvinston	Lambton.
Toronto	Gibbons, Nina B.	Leamington	Essex.
Toronto	Gott, E. Edna	Amherstburg	Essex.
Ottawa	Hagerman, Arlissa	Athens	Leeds.
Toronto	Hamshaw, A. Elizabeth	West Toronto	York.
Ottawa	Huffman, F. H.	Colebrook	Addington.
Ottawa	Jamieson, Florence E.	Stanstead	Quebec.
Ottawa	Johnston, Maude	Cornwall	Stormont.
London	Justin, Myrtle	London	Middlesex.
London	Jull, Alice	Norwich	Oxford.
Stratford	Kilty, Minnie E.	Clinton	Huron.
Toronto	Kennedy, Catharine	Sarnia	Lambton.
London	Keys, Geo. P.	Blake	Huron.
Stratford	Laing, Annie C.	St. Mary's	Perth.
Toronto	Lane, Etta	Toronto	York.
Stratford	Law, Isobel	Drumbo	Oxford.
Peterborough	MacKenzie, Jennie	Rathburn	Ontario.
London	March, Margaret	Dutton	Elgin.
Ottawa	McEwan, Annie	Martintown	Glengarry.
Toronto	McLeod, Catherine	Star	Peel.
Ottawa	Medcof, John D.	Holleford	Frontenac.
London	Moran, Anna	Essex	Essex.
Ottawa	Moss, Eldwin W.	Wales	Stormont.
London	Murray, Josephine	Wilton Grove	Middlesex.
Toronto	Myers, Nellie	Goodwood	Ontario.
Stratford	Neilands, Clara E.	Woodford	Grey
Toronto	Parker, Emily M.	Toronto	York.
Toronto	Phillips, Addie E.	Toronto	York.
Toronto	Russell, Lula	Walkerville	Essex.
Stratford	Sivell, Jean	Owen Sound	Grey.
London	Smith, Mary	Parkhill	Middlesex.
Stratford	Spearin, Nellie E.	St. Mary's.	Perth.
London	Thomson, C. C. E.	Aylmer	Elgin.
Toronto	Thomson, Juanita	Toronto	York.
London	Tiffin, Cora	Thamesville	Kent.

THE SUMMER SCHOOL.

The courses offered at the Summer School were: 1. Art and Constructive work; 2. Woodworking and Mechanical Drawing.

The instruction given at this course is recognized by the Department of Education, thus giving students who drop out from the full course an opportunity to complete their work at the Summer School. There were twenty-six students in attendance, 14 taking course 1, and 12 course 2. Seven were working with a view to qualifying for the Certificate of Manual Training. Of these, Mr. Joseph Slaughter, Toronto, completed his course by submitting his thesis and writing off his outstanding subjects—Applied Design, Plane and Solid Geometry, Construction and Theory of Manual Training. He was granted a Specialist's Certificate by the Department of Education and by the College, full course diploma. Mr. H. S. MacPherson, Simcoe, received from the Department of Education an Interim Certificate on his work in Woodworking, and taking his examination in Construction and in Tools, and Mr. T. T. Carpenter, Brantford, was awarded a Certificate in Manual

Training. Of the remaining four, two are doing Woodworking and Mechanical Drawing, and two are working at the Forging Course. All in attendance were granted the College Summer School Certificate. Those in attendance were:

Mr. J. E. Chambers, Guelph.
Mr. W. H. Flumerfelt, Guelph.
Mr. W. G. Ward, Guelph.
Mrs. J. Lyon, Guelph.
Miss E. MacMillan, Guelph.
Miss M. R. MacCallum, Guelph.
Miss F. V. Carter, Guelph.
Mr. W. R. Beattie, Toronto.
Mr. W. F. Darroch, Toronto.
Mr. J. Slaughter, Toronto.
Miss M. F. MacKenzie, Toronto.
Mr. H. S. MacPherson, Simcoe.
Mr. T. T. Carpenter, Brantford.
Miss M. Long, Brantford.
Mr. H. L. Ingram, Belleville.
Mr. D. N. Cornell, Cornwall.
Miss H. L. Martin, Waterloo.
Miss T. Smith, Lindsay.
Miss M. C. Davidson, St. Catharines.
Miss L. J. Smith, St. Catharines.
Miss A. E. McKowan, Avonton.
Miss I. H. Breakill, Madoc.
Miss N. Feeney, Madoc.
Miss M. Neelands, Forest.
Miss A. Neelands, Forest.
Mr. J. T. Curtis, Seaforth.

FALL TERM.

During this term the following classes were in session:

Farm Mechanics and Metal Work—Second Year Agricultural Students	94
Color and Household Decoration (Macdonald)	52
Woodworking (Macdonald)	24
Teachers' Normal Course	2

Through the kindness of the International Harvester Company, of Hamilton, a very profitable and enjoyable day was spent by the Second Year students in examining the large range of agricultural machinery produced by this world-famed firm. The boys were divided into groups of tens and placed in charge of guides who explained the various processes the materials were treated before being assembled into the different machines. By this arrangement every facility was given the students to obtain much serviceable information.

Donations of implements to Machinery Hall have been received from:

The Avery Company, Peoria, Ill.: 1 Perfection Corn Planter; 1 Corn Cultitor.

The Champion Potato Machinery Co., Hammond, Ind.: 1 Potato Planter; 1 Potato Cutter.

The Paris Plow Company, Paris, Ont.: 1 Plow, No. 10; 1 Riding High Lift Gang and breaker attachment for same; 1 Walking Plow, No. 15; 1 Plow, No. 21, with skimmer, coulter and wheel; 1 14 in. Combination Plow; 1 14 in. Brush Breaker Plow; 1 Riding Plow, No. 51; 1 Manure Spreader, No. 3.

I desire in conclusion, to express my hearty appreciation of the support and assistance received from Mr. E. W. Kendall throughout the year, and the conscientious, systematic and efficient services rendered by Mrs. Walter Misener, and Mr. J. A. Stiles, during the Spring term, and Mr. R. W. Wade in the Fall term. Their respective work was conducted with the utmost zeal, and the high standard of the department was maintained in the subjects of which they had charge; to thank those firms who have contributed so liberally to our implement and machinery outfit in Machinery Hall, thereby enabling us to cover more fully than we otherwise could the various kinds of implements employed on the farm; and to convey to the International Harvester Company our gratitude for their courteous and generous reception of the students when visiting the factory.

I have the honor to be, your obedient servant,

JOHN EVANS.

PART XIX.

THE PROFESSOR OF FORESTRY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith the report of the Forestry department for the year 1909:

The courses of lectures as outlined in the College Calendar have been delivered to the second and fourth year students. Special lectures were also given to the rural school teachers in attendance at the Nature Study course.

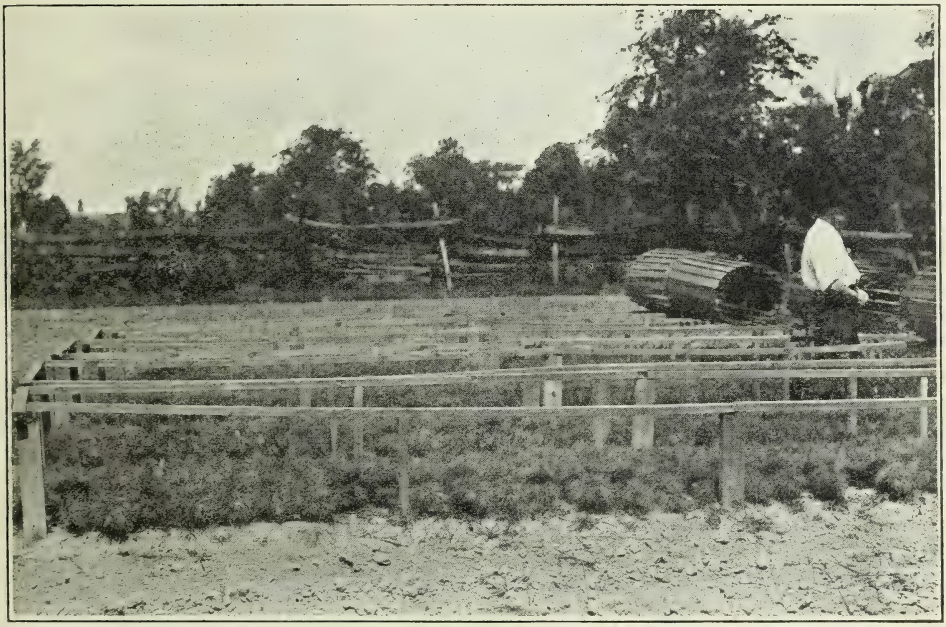


Fig. 1.—Two-year-old White Pine in seed beds. These plants are now ready to transplant.

COLLEGE WOODLOTS AND PLANTATIONS.

Owing to the fact that the labor of this department has been transferred to the Forest Station in Norfolk county, very little has been done in the College woodlots or plantations.

The vacant portions of the north and south woodlots have been filled in by planting with pine, spruce and walnut. These two woodlots are fully stocked and all that will be necessary in the future will be to thin out scrubs or remove mature timber.

NURSERIES.

Last year when moving the nursery stock to Norfolk Forest Station, it was necessary to leave the one year old White Pine seedlings, as they were too small to move.

These plants are now two years old and are ready for transplanting. There will be about 80,000 and they will be shipped to the nurseries in Norfolk.

CO-OPERATIVE PLANTING.

During the last season about 380,000 plants were sent out to applicants. We had expected a larger demand, but a number of the applicants were unable to handle the work, owing to the extremely wet season last spring. The material distributed consisted largely of White Pine, Scotch Pine, Norway Spruce, White Ash and Black Locust.

The results in these plantations throughout the Province are very satisfactory, considering that the trees are usually planted on steep hillsides or other untillable soils. Many plantations contain from 80 to 90 per cent. of living trees.

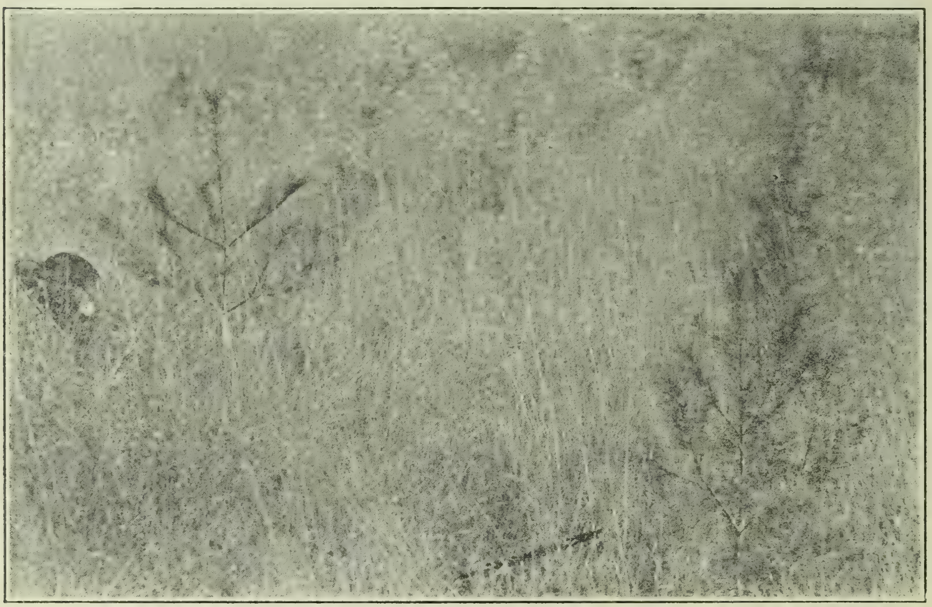


Fig. .2—White Pine three years planted on a rough hillside without cultivation. These plants have grown about 18 inches during the last summer and should now commence a rapid growth as they are above the grass and weeds.

An interesting feature of the work is that a number of applications have come for material to plant up vacant spots in the woodlot. In our circulars the department strongly advocates the planting of evergreens such as White Pine or Norway Spruce, about the borders of the woodlot. It is difficult to keep forest conditions of soil and undergrowth in woodlots of small area where hardwoods or deciduous trees prevail. A border of spruce and pine gives the soil protection from the wind, which is one of the most important factors in insuring good tree growth.

Open spots on the interior of the woods should be planted with some of the more valuable woods. The department has been supplying White Ash and Black Locust for this purpose. Black Locust should prove a good tree in the woodlot as it grows very rapidly during its early life and produces fence, post and fuel material in from twenty to thirty years.

This last fall the department had collected nuts of Black Walnut, Butternut, Hickory and Red Oak. These were stored and will be distributed in the spring for planting in vacant spots in the woodlots.

Reclamation of Non-Agricultural Lands.

As intimated in last year's report (1908) our nurseries and field staff have been transferred to the Norfolk Forest Station. The Province has at this Station 1000 acres of land which is being placed under forest management and on which is being developed a permanent forest nursery. The work being done at this Station will appear more fully in a separate report to be issued by the Department of Agriculture.

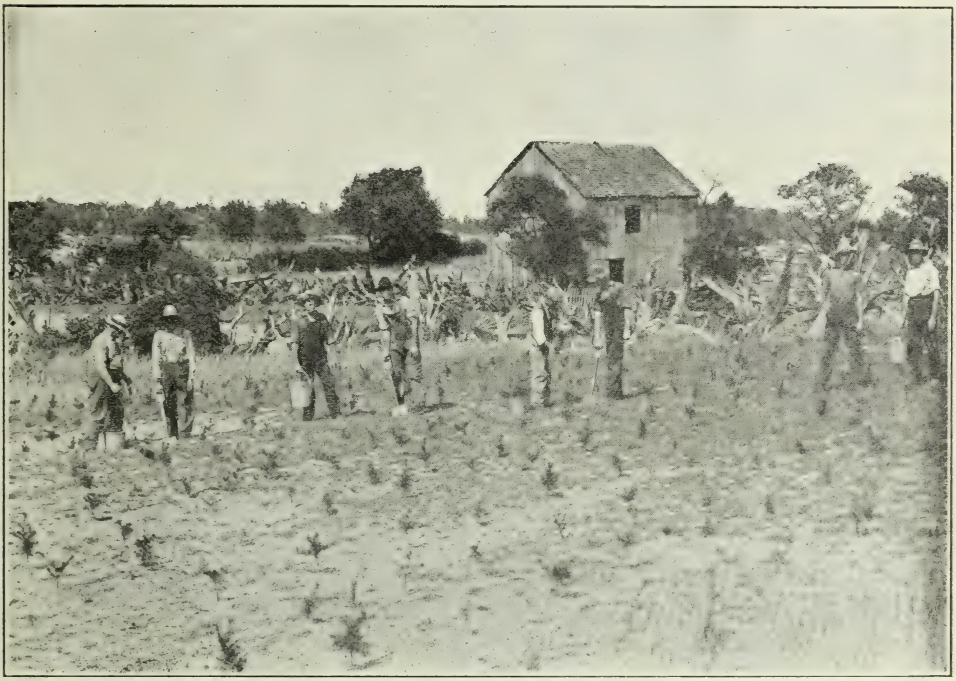


Fig. 3.—Reclaiming waste sand land in Norfolk County by planting with Pine.

Respectfully submitted,

E. J. ZAVITZ.

PART XX.

THE PROFESSOR OF NATURE STUDY.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith the report of the Nature Study department for the year 1909.

The course given to teachers from April 19th to June 29th, marked the completest, most systematic effort of the College to bring its teaching to the boys and girls in our elementary schools. Ninety-seven teachers entered the work and ninety-two completed it; three withdrawing on account of ill health, one changing to the course in Industrial Arts, and one leaving to take a position. It was undertaken by the College on behalf of the Department of Education as a special part of the training of Normal School students. The aim of our work was to train teachers in the scientific principles and practices of modern farming so that the country or village school might adequately sympathize with and direct the life interests of country boys and girls. There was an acknowledgment in the effort that the country school owes something more and something new to the country boy and girl; that the great changes that modern science has brought about in modern industry and society must make for new adjustments in the work of the schools along vocational lines.

There was a recognition of the principle, too, that for a special work to be done in the schools, there must be a special training for teachers. If Elementary Agriculture and Horticulture or a vocational Nature Study is required to be taught, teachers must first be taught *what to teach and how to teach it.* Moreover the training must be of a real practical character; no mere telling how to do it, nor reading how to do it. It had to be as nearly real as it is possible to show the real in a training school. This feature of a training for the teachers of country schools necessitates the use of the Agricultural Colleges. Throughout the continent this use of the Colleges is being more and more accepted by the provincial and state educational authorities. Our work in this regard typifies a movement that is growing wider every year.

The initial movement here was favored in having a specially qualified body of teachers for its first class. Nearly all of them were born and brought up in the country; all of them had taught in country schools; many of them had already made efforts, without a special training, to teach some of the work in their schools; they had undertaken in their contract with the Department of Education to remain in Ontario for three years and as far as opportunity offered teach the subject along the lines of their special training here. Moreover they came to us accredited as Normal School graduates. They had passed their final examinations at Easter. They were, one might say, all successful, experienced teachers volunteering to equip themselves further for a higher or wider scope of work in the country schools. In giving such a body of students an insight into the meanings and problems of agricultural and rural life in general the College had an easy and encouraging task.

The carrying out of the course was not accomplished without some radical re-arrangements in the College routine. A number of the members of the teaching staff had to continue to take for the ten weeks' term as many classes as they had

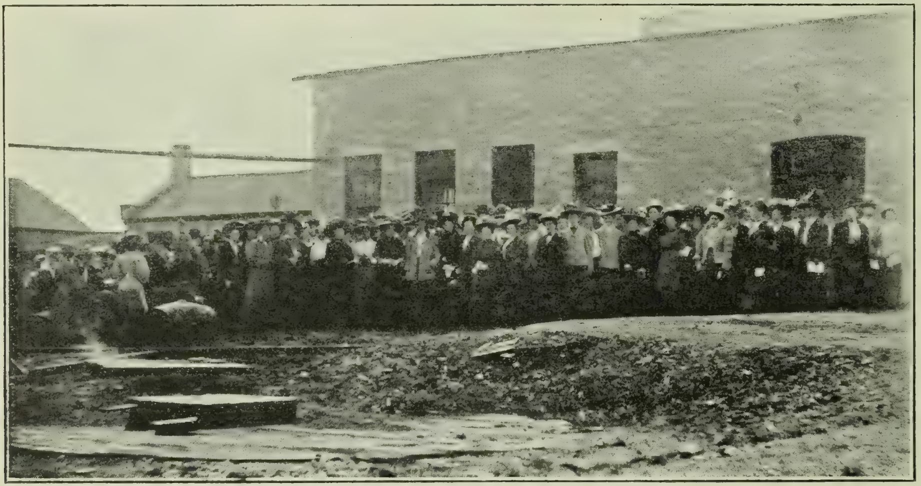
had with the regular College students during the year, besides having to re-arrange the work and re-adjust their methods of instruction; this interfered in some cases with the experimental or investigational work which is ordinarily carried on in spring and summer by the departments of the College. The other members of the staff who gave fewer lectures, had to plan their work so as to meet the requirements of the time table; in many cases this was done without not a little inconvenience. As in all the College undertakings in the cause of agricultural education, however, our teachers gave of their time, talents and enthusiasm without grudging. Everyone was a ready and willing helper. This enthusiasm for the cause impressed itself too on the students—like teacher, like scholar; from their teachers they caught enthusiasm. We may hope in many cases this will be carried into their work, back in the little country schools, and as a little leaven, help to leaven the whole lump of education in the rural schools into something better than has yet been known.

The re-arrangement that seemed most radical was the turning of the College Residence for men into one for women. It may have appeared unfair to those who had to vacate pleasant quarters. It was to be regretted that accommodations would not permit the women students to carry on their work without encroaching on the apparent rights of the fourth year students remaining for their final examinations and the other students who stayed over to work on the farm. However, the business of the College is primarily to serve the cause of Agricultural education at large in the Province of Ontario, and the experiment in teacher-training looked to outweigh in its importance the comforts of a relatively few male students. The results justify the arrangements. For ten weeks the one hundred and thirty-five women attending the classes were surrounded night and day with an agricultural college environment. There were no detractions such as city boarding house residence would furnish. They were on hand always for evening lectures, gardening exercises, etc., or for early morning bird tramps. They formed close friendships and associations that broke down any tendencies to remain in separate groups representing the different Normal Schools. They became a unified body of Ontario teachers cemented in a common enthusiasm for the College and the carrying of its lessons to the boys and girls in country places. No one can measure the effects of their influence. It must be not inconsiderable for it will yearly reach thousands

Visiting school children in School Garden.

of our youth when they are in the plastic stage and readily moulded or directed by their teachers. Residence life was not the least valuable part of their training here.

Efforts were made to have the work made known and also to have the teachers distributed widely. Ninety-seven teachers for the whole Province meant a wide separation between representatives, one or two for each county if they could be so placed. Lists were sent to the Inspectors and requests made for vacant schools where encouragement would likely be given to school gardening and agricultural teaching. In some cases an active interest was taken in securing our teachers, with the result that some inspectorates have a comparatively large representation of them. Of course the proximity of their homes and the salaries offered were determining factors, too. Most of the teachers were engaged at a salary of at least $500. A few are in receipt of $525 or $550, while a few others, taking schools near their homes, engaged for less than $500. As a rule the salaries offered in the western part of the Province were higher than those offered in the eastern part.



Teachers visiting Guelph Gas Works.

So far as I have been able to learn from reports made by the students, they are distributed in the schools, as shown by the following list. A few are not taking schools until the New Year. Doubtless the remainder are actively engaged in Ontario schools. We have endeavored to keep in touch with them all but as there is no official connection between them and the College after they leave us this is somewhat difficult to accomplish. It might be well for the cause if there was some means of following up their work in order to have it properly directed, unified, and reported upon. Scattered and isolated as they are in the country schools there is danger of their effectiveness being lost. Especially so if they should receive little encouragement or help from trustees or inspectors. It is desirable that they be held together as a coherent advance guard for the organized grand army of the "Ontario Special Rural School Teachers" that is to be. Besides the monetary encouragement ($30 per annum) they are to receive for acting as special teachers in Agriculture and School Gardening, there might well be some encouragement offered to bring them together periodically to the College for the renewing of their interest and the planning for concerted action and methods, in somewhat the manner that the High School Agricultural Specialists are brought to the Experimental Union in December.

A few of the class are engaged in graded town schools. The greater majority of them are in one-teacher rural schools.

County.	Student's Name.	School Section.	P.O. Address.
Algoma	Miss M. C. Wright	Graded, Urban	Blind River.
	Miss Bessie Christelaw	“	“
Brant	Miss Edna A. Twiss	9 Brant	Brantford.
	Miss Jessie R. Eakins	15 Burford	Fairfield Plains.
Bruce	Miss Lizzie Smart	11 Brant	Vesta.
	“ Margaret Padfield	5 Brant	Walkerton.
	“ A. M. Sillers	1 Brant	“
Elgin	Miss Florence Wegenast	11 Malahide	Aylmer.
Essex	Miss Margaret Whiteman	7 Mersea	Leamington.
Grey	Miss Emma Batterman	6 Sullivan	Desboro.
Grenville	Miss Edna M. Root	1 Augusta	Prescott.
Haldimand	Miss Mabel McClung	5 Rainham	Rainham.
Halton	Miss Myrtle Matthews		Acton.
Hastings	Miss Katie O'Rielly	Separate School	Tweed.
Huron	Miss Mabel Walsh	Lower Wingham	Wingham.
Kent	Miss Jean Schleihauf	6 Chatham	Eberts.
	“ Lucy Kenny		Muirkirk.
	“ Violet M. Savage	1 Oxford	Clearville.
Lambton	Miss Jennie McDonald	20 Plympton	Camlachie.
Lanark	Miss Anna McIntosh		Herron's Mills.
Lincoln	Miss Nettie A. Stewart	1 Clinton	Beamsville.
Middlesex	Miss Clara Loveless	19 London	Fanshawe.
	“ Ella E. Baker	19 Westminster and Delaware.	Littlewood.
	“ Ella M. Doupe	7 Dorchester	Putnam.
	“ Eliza McLauchlan	12 Caradoc	Melbourne.
Nipissing	Miss Lizzie A. Rankin	1 Kerns	Milberta.
Norfolk	Miss Maggie G. Hamilton	12 Windham	Brandy Creek.
Northumberland	Miss Gertrude Tucker	3 Haldimand	Wicklow.
	“ Anna Brown	Town	Cobourg.
Ontario	Miss Laura G. Francis	5 Whitby & E.W.	Oshawa.
	“ C. P. Vanvalkenburgh	5 West Whitby.	Port Whitby.
	“ Lilly E. Wilson		
Oxford	Miss Margaret King	8 Blenheim	Plattsville.
Perth	Miss Florence Millen	10 Ellice	Kuhryville.
	“ Laura Fuller.	1 Ellice	Stratford.
	“ Elfleda Roy	6 Downie	Avonton
	“ Gertrude Sprague		Trowbridge.
Peterborough	Miss Ella M. Dewart	2 Smith	Fowler's Corner.
Prescott	Miss Mary Watson		Pendleton.
Prince Edward	Miss Lulu Vickery	17 Hillier	Consecon.
Simcoe	Miss Eleanor Perrott	1 Essa	West Essa.
	“ Bella E. Groves		Creemore.
Stormont	Miss Mary E. Eaman	17 Roxborough	Avonmore.
	“ Jennie L. Harkness	Graded, Urban.	Cornwall.
	“ Edith Fetterley	8 Finch	Glen Payne.
Thunder Bay and Rainy River	Miss Gretta E. Fahey	Graded, Urban.	Fort Frances.
	“ Grace B. Jones	“ “	Fort William.
Waterloo	Miss F. E. Monteith	13 Wilmot	Baden.
	“ Annie M. Bell	1 Waterloo	Blair.
	“ Annie M. Boal	16 N. Dumfries.	Glenmorris.
	“ Bessie Van Every	9 Waterloo	Waterloo.
	“ Evelyn Ford.	18 Dumfries	Galt.
Welland	Miss Mae P. McLelland	Wainfleet	Marshville.
Wellington	Miss L. E. Patmore	4½ Guelph	Marden.
Wentworth	Miss May S. Cody	8 Beverley	Ryckman's Cor.
	“ Irene M. Clark	3 Ancaster	Ryckman's Cor.
	“ Lena Field	7 Saltfleet	Tapleytown.
	“ Myrtle Trainer		Aldershot.
York	Miss Grace Gilmour	22 King	Eversley.
	“ M. C. Lloyd	13 S. York	West Toronto.
	“ Mabel Patterson	12 Vaughan	Woodbridge.
	“ Clara Williams	29 York.	West Toronto.

General Character of the Work.

The ten weeks' course was a very busy one. The work was mapped out so as to bring the students into touch with practically every department of the College with emphasis laid on the work in Agriculture, Horticulture, Botany, Physics, Entomology and School Gardening. The day's work was divided into four equal class periods of an hour and a half each. But each morning, commencing at 8.30 there was a half hour period devoted to religious exercises, and general discussions on the work at large and its applications in public school work. Frequently in the evenings there were lectures in English Literature or addresses by outside speakers.

In most of the subjects the detailed outline was satisfactorily completed. In a few there had to be a curtailment of the number of lessons owing to absence of the lecturer or to encroachments of examinations and term closing.

Much of the instruction was given out of doors in the fields, orchards, woods or campus, or indoors in greenhouses, stables or laboratory. All of it was of a practical character, accompanied by actual demonstrations, experiments, or lantern views. In a number of subjects the instructors presented their work in typewritten outlines and synopses which they amplified by lecture and discussion; at the end of the course these sheets put together made quite a comprehensive text book in Agriculture for the teachers. This plan lends itself very well to short courses of instruction. It enables the instructor to cover his subject concisely, to place his topics in their proper and relatively important aspects, and to impart information without fear of its being misunderstood or wrongly recorded by his pupils. The advantages to the pupils are that it frees them from the necessity of elaborate note-taking, while acquainting them with good plans for recording lecture data, and giving them easily read records that are ready references for review or information.

The general health of the class was good, there being no more illness than might be expected amongst any corresponding number of teachers. Although due warning had been given to candidates by announcements made through the Normal School principals and in the circular issued by the Department of Education, that good robust health was a requisite for admission to the work and success in it, three students found themselves physically unable to meet the strain of the work and were forced to withdraw. A few others continued the work under physical disadvantages, and consequently were not able to get as much benefit from the course as they otherwise would. In no case, so far as known, was there any impairment of health through the exactions of our work. All instances of ill health mentioned above had their beginnings before admission here. On the other hand the health of most of the students was improved by the recreative character of the work in gardening, field tramps, etc. In subsequent classes the necessity of sound health should be insisted upon as a *sine qua non* for admission.

The complex character of the instruction to be given in a comprehensive course in Agriculture for teachers may be seen by a glance at the lists of subjects involved. Not one of them can be left out if justice is to be done the common interests of farming.

Studies relating to Plants and Plant Life: School Gardening, Botany, Horticulture, Agriculture, Forestry, Bacteriology.

Studies relating to Animals and Animal Life: Entomology, Animal Husbandry, Dairy Husbandry, Poultry Husbandry.

Studies relating to Physical Nature: Chemistry, Physics.

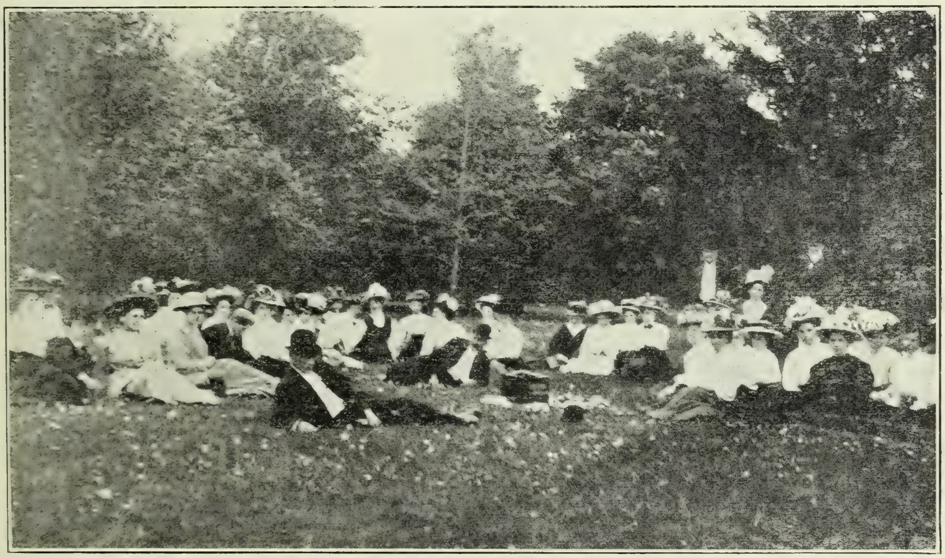
Economic Studies: Farm Life, Industries, etc.

Pedagogics: Methods of teaching the subject, etc.

TIME TABLE.

The work was carried out in accordance with the following time table, excepting in the subject of Farm Carpentry. On account of the Manual Training department being fully employed with the class in Industrial Arts, this had to be cancelled.

——	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
9.00–10.30	Physics.	Entomology.	Physics.	Entomology.	Bacteriology,
10.30–12.00	Chemistry.	Botany.	Field Husbandry.	Botany.	Animal Husbandry.'
1.30– 3.00	Field Husbandry.	Fruit, Vegetable or Landscape Gardening.	Forestry.	Farm Carpentry or Visits to Industries.	Experimental Botany, School Gardening Methods.
3 00– 4.30	Dairy Husbandry of Poultry.	Floriculture.	Field Work.	do	do



Visiting teachers receiving lessons on the campus.

COURSE OF STUDY.

Below is given for each subject the outline of work prepared for the circular issued by the Department of Education with some details showing how the work was carried out. As the whole work is somewhat in the nature of a pedagogical experiment, these particulars may prove of value to other institutions that are about to undertake similar lines of work.

I. FARM LIFE AND ALLIED INDUSTRIES. Lectures will be given by Institute lecturers and others working for the improvement of conditions in the country—in school, home, and farm. Discussion will be held as to how the school and teacher can help towards an improvement. In this connection visits will be paid to country schools; students will also be made acquainted with the government publications and educational organizations. (About five lectures.)

Visits will be made also to local industries in Guelph to learn how urban activities are interrelated with those of the farm. (About four afternoons.)

Instructor—Prof. McCready.

In this part of the course we had many helpers. Miss Yates, one of the leading workers in the Women's Institutes of the Province discussed the question of improving the position of the women in the country and the conditions of labor, and showed how the teacher and Women's Institute workers could co-operate.

Senator McColl, of Victoria, Australia, who visited the College on an inquiry into agricultural education in America, spoke to the class regarding the work and status of the teachers in Australia, showing how they were organized there as a strong body of civil servants.

Dr. Robertson, Principal of Macdonald College, Quebec—the man whose plans in the founding and organizing of the Macdonald Institute were meeting fulfilment in this very class—gave two addresses. In one he discussed the necessity of the teacher's re-adjusting her ideals of education so as to ensure the child's receiving instruction that would help it to better adjust itself to the world of nature about it and the work-a-day world with which modern society environs it. In the other he appealed to teachers for the inculcating of a higher patriotism, and the giving of a whole-hearted service so that Canada might attain to its best possibilities in homes and citizenship.

The class came into personal touch too with a party of distinguished American educators who visited the College in June.

Dr. Frissel, President of Hampton Institute, Virginia, outlined to the class the problems of education amongst the negroes of the Southern States, and pointed out how their hopes lay in the training of industrial leaders and teachers at Hampton and the Booker Washington institution at Tuskeegee.

Dr. Glen, the General Manager of the Russell Sage Foundation, spoke on the nature and methods of the social reforms made possible by the munificent bequest of Mrs. Sage—the organizing of play grounds for children, the improvement of tenement districts in crowded cities, and the encouragement of schools in places where education was at a low ebb. Mrs. Glen, who accompanied her husband in his visit, spoke on the problem of negro education, and Mrs. Mumford, whose work lies in educational reform in Virginia, outlined their plan for improved schools and teachers amongst the white population in her state.

Rev. J. Anthony, of Agincourt, Ont., a gentleman who has given considerable study to the rural life problems of Ontario, spent a day in visiting the class and addressed the students on the difficulties and possibilities of the teacher's work in the country—the need for leadership and enthusiasm in our country schools.

Dr. Coleman, Vice-Principal of the Faculty of Education of the University of Toronto, addressed the class on *"Some Educational Ideals."*

Dr. Merchant, Inspector of Normal Schools under the Department of Education, during his inspectoral visit to the classes, addressed the students and directed their attention to the special field of work that they were being prepared for and the necessity for putting the instruction to practical use in the education of children.

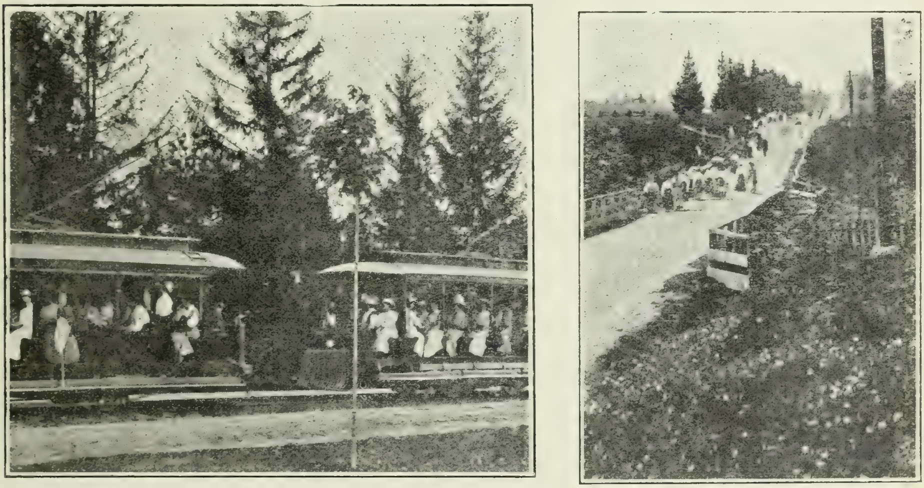
In June Mr. L. H. Newman, B.S.A., Secretary of the Dominion Seed Growers' Association, addressed the class on the work of that organization; explained the principles on which seed is improved and showed how necessary this was for good farming and how teachers might introduce their pupils to the work.

Mr. D. Young, Principal of the Guelph Public Schools, addressed the class on the aims and plans of the Ontario Teachers' Alliance, and as a result a branch was organized. Further mention is made of this elsewhere.

The class visit to Marden School was very enjoyable and profitable. This is a country school located two miles from the end of the Guelph Street Railway track in the midst of a splendid agricultural section devoted chiefly to stock raising. There is a good school-master's residence in connection with the school and the teacher, Mr. P. H. Buchanan, has been carrying on School Gardening for the past three years. After hearing recitations of some of the classes, the students examined the school library, the children's books and exercises and then adjourned to the school garden, where the work was discussed in all its details with Mr. Buchanan. An impromptu concert followed by lunch and games preceded the tramp home in the evening. The insight that the teachers get into the work of a real school garden in a real country school such as that at Marden is of great advantage in the actual planning of similar gardens elsewhere.

A profitable afternoon was spent also in a visit to the Guelph Collegiate Institute. The official inspection of the school cadets was witnessed outdoors, and an exhibition of calisthenics and marching by the girls in the gymnasium. Afterwards the class was entertained in the school by Principal Davison and his staff by lantern demonstrations in the science room, an inspection of the pupils' exercises in drawing, etc.

Much pleasure and profit resulted also from visits to factories and industries. One can hardly speak too highly of the kindness and consideration shown the classes. In all cases guides were put in charge of sections of the class to explain processes. In this way studies were made of the manufacturing processes in the Guelph Gas Works, Tolton's Agricultural Implement Works, The Guelph Waterproof Clothing Factory, Tolton's Paper Box Factory, The Guelph Carpet Works, The Guelph Spinning Mill, Raymond's Sewing Machine Factory, Raymond's Cream Separator Factory, Bell's Organ and Piano Factory, and Goldie's Flour Mills and Barrel Factory. At Mr. Goldie's the class was generously treated, too, to a view of his splendid collection of paintings and his wild flower gardens.



Teachers en route to Marden.

On May 27th the classes paid a visit to Galt—the Manchester of Canada—and were kindly taken in hand by the Board of Trade for an inspection of the town and some of its leading industries. En route a visit was paid to the large establishment of the Forbes Company at Hespeler, where every process in the making of woollen cloth was exemplified and explained. At Galt the class broke up into sections for visiting the different large iron-working establishments as well as the knitting mills and shoe factories.

To most of the students these inspections of our large industrial concerns came as a revelation of the possibilities of manufacturing in Canada as well as bringing new thoughts to their minds regarding the need of the school's giving special lines of instruction for those who are to be the workers in these industries.

Several of the publications of the Dominion Department of Agriculture, Ottawa, and the Ontario Departments of Agriculture and Education, Toronto, were given into the hands of each student and their use in the School Library shown and discussed. It is felt that one of the important lines of work for the teacher of Elementary Agriculture lies in the directing of the pupils in the schools to the uses to be made of the free government publications, thus making the schools active partners in furthering governmental aims towards the dissemination of technical information.

II. SCHOOL GARDENING. Brief sketch of the development of school gardening in Canada and abroad; its aims as a school study; laying out of a garden; individual plots; class plots; teacher's plots; experimental plots; forestry plots; borders, keeping of tools, home gardens; keeping of garden records; observation in gardens at Marden School and Macdonald School; school exhibits (4 lessons).

Teachers' class visiting Marden School Garden.

Each student will be provided with a garden for practice and observation. After the gardens are planted the work in them will be carried on without special provision on the time table.

INSTRUCTORS.—Prof. McCready and Miss Varley.

There was some delay in commencing this work last spring on account of the backwardness of the season. The class entered on April 19th but it was not until May 8th that the ground was fit to work—on May 2nd there had been indeed a heavy snowstorm. In spite of this delay, the gardens as a whole were well advanced when the term closed on June 30th.

Up to May 24th, when she left to take charge of a school garden under the Board of Education in Philadelphia, I had the assistance of Miss E. Varley. As she was a graduate of the Swanley Ladies' Horticultural College, England, and had taken a year's instruction at this College in special studies relating to Gardening and Nature Study, she was of great assistance in getting the garden organized and the practical work started. A Committee and Garden Superintendent selected from the class helped in the management of the work afterwards.

The garden was laid out to allow each teacher a plot either 4 ft. x 10 ft. or 5 ft. x 10 ft. Side paths were two feet wide and end paths three feet. The work was closely associated with the gardening carried on at the Macdonald Consolidated School; our plots lay on the north and east sides of the children's plots and our teachers were thus able to observe from day to day the work of the children.

There were two classes of plots in the garden. Half of them were special Observation or Experimental Plots that were outlined and arranged for before the class commenced, as a series of suggestive school plots. The teachers were left to their own freedom in planning the remaining half. Each two teachers had one prescribed plot and one individual plot to take charge of; a rake was allotted to one teacher, the other had a hoe. There was a supply of spades, digging forks and hand weeders available for general use.

A teacher and her class from Haldimand Co. visiting the College in June.

The class worked together in preparing the ground and planting the seed. Afterwards the work was carried on at the convenience of the individual teacher. Generally speaking, the weeding or watering was done as an evening recreation; some paid their visits in the morning. Each teacher was expected to visit her garden each day and record her work and observation in a garden diary. At class assembly each morning garden observations were reported and discussed.

The following school garden plots were represented in the teachers' gardens:

EXERCISES IN ELEMENTARY AGRICULTURE AND HORTICULTURE ARRANGED FOR USE IN TEACHERS' CLASSES.

Observation and Experimental Plots for the School Garden.—In the plots outlined below there are represented most of the common cultivated plants grown in our fields, forests and gardens. One plot will be placed in charge of two students. The plots should be labelled plainly so that everyone in the class may understand what is being done. It is hardly necessary to say that it is not intended that such an extensive work should be repeated in every small School Garden that may be commenced in the Province. But what is intended is, that in these, teachers will find suggestions from which they may select a few suitable plots to represent this important side of School Garden work. Besides an observation plot, each pair of students will carry on independently selected work in a garden plot adjoining.

Representing the Work of the Experimental Union, Schools' Section.

Schools' Experiments Section—These plots are for Rural Schools particularly.

1. 4th Class Plot—Agriculture—Different species of Wheat.
2. 3rd Class Plot—Forestry—Different species of Maples.
3. 2nd Class Plot—Horticulture—Different kinds of Onions.
4. 1st Class Plot—Floriculture—Climbing and Dwarf Nasturtiums.

Children's Gardening Section—These plots are for Home or School Gardens. Seeds are provided to children at a nominal cost.

5. Junior 1st—Nasturtium and Lettuce.
6. Senior 1st—Sweet Peas and Radish.
7. Junior 2nd—Pot Marigold and Beets.
8. Senior 2nd—Corn Flower and Spinach.
9. Junior 3rd—Petunia and Beans.
10. Senior 3rd—China Pinks and Carrots.
11. Junior 4th—Verbena and Onions.
12. Senior 4th—Asters and Sweet Corn.

Representing Farm Crops.

General Classes:

13. Wheat, Oats, Barley.
14. Rye, Buckwheat, Flax.
15. Field Peas, Field Beans, Vetches.
16. Mangels, Sugar Beets, Field Carrots.
17. Swede Turnips, Fall Turnips, Kohl Rabi.
18. Potatoes, Pasture Rape, Kale.
19. Corn, Sugar Cane, Broom Corn.
20. Alfalfa, Sainfoin, Clover.
21. Hungarian Grass, Common Millet, Timothy.

Special Classes:

22. Wheat—Red Fife (Spring Wheat for Flour); Wild Goose (Spring Wheat for Macaroni); Dawson's Golden Chaff (Winter Wheat for Flour).
23. Oats.—Early Ripe (Spreading Head with White Grain); Tartar King (Side Head with White Grain); Joanette (Spreading Head with Black Grain).
24. Barley—Mandscheuri (Six-rowed and Bearded); Success (Six-rowed and Beardless); Two-rowed Canadian (Two-rowed and Bearded).
25. Buckwheat—Japanese (Dark Brown Grain); Silver Hull (Light Silvery Grain); Rough (Notched Grain).
26. Rye and Flax—Prolific Rye (Spring Variety); Mammoth Rye (Winter Variety); Common Flax.
27. Field Peas.—Canadian Beauty (White Peas); Early Britain (Greenish Brown Peas); Prussian Blue (Blue Peas).
28. Field Beans.—Prize Winner (Small White); Marrowfat (Large White); Red Kidney (Large Red).
29. Cow Peas and Soy Beans—Whip-poor-will (Cow Peas); Early Yellow (Soy Beans); Medium Green (Soy Beans).
30. Vetches and Grass Peas—Common Vetches (Spring Variety); Hairy Vetches (Winter or Spring Variety); Grass Peas.
31. Mangels—Mammoth Long Red (Long Red); Yellow Leviathan (Yellow Intermediate); Ideal (Yellow Tankard).
32. Sugar Beets.—Giant White Feeding (Large White); Royal Giant (Large Red or Pink); Kleinwanzlebener (Medium Size, White).
33. Field Carrots.—Long White Belgian; Improved Short White; Rubicon Half Long Red.
34. Swede Turnips—Sutton's Magnum Bonum (Purple Top); Carter's Invicta (Bronze Top); White (Greenish Top).
35. Fall Turnips—Early American (Purple Top, Flat); White Egg (Round); Cow Horn (Long).
36. Kohl Rabi—Early White Vienna; Goliath Purple; Garton's Large Green.
37. Potatoes—Empire State (White); Early Fortune (Rose); Stray Beauty (Red).
38. Rape and Kale—Dwarf Essex Rape (Biennial); German Summer Rape (Annual); Thousand Headed Kale.
39. Corn—Henderson's Eureka (Dent); Salzer's North Dakota (Flint); Golden Bantam (Sweet).

40. Sorghum—Early Amber Sugar Cane; California Golden Broom Corn; White Kaffir Corn.
41. Millet—Japanese Panicle (Shiny Brown Seed); Japanese Barnyard (Grey Seed); Japanese Common (Yellow Seed).
42. Native Grasses—Red Top; Kentucky Blue Grass (Round Stem); Canadian Blue Grass (Flat Stem).
43. Foreign Grasses—Timothy (Roundish Seed); Orchard Grass (Long Seed); Tall Oat Grass (Bristly Seed).
44. Clover—Red (Red Blossoms); Alsike (Pinkish Blossoms); White (White Blossoms).
45. Perennial Crops—Alfalfa or Lucerne (Seed small and kidney shaped); Sainfoin (Seed large and kidney shaped); Burnet (Seed four-sided).

Representing Experiments with Potatoes.

46. Comparison of Different Sized Tubers Used for Planting:

A—Whole Potatoes, 8 ounces each; B—Whole Potatoes, 4 ounces each; C—Whole Potatoes, 2 ounces each.

47. Comparison of Different Sized Sets:

A—Each piece with one eye and weighing 2 ounces; B—Each piece with one eye and weighing ½ ounce; C—Each piece with one eye and weighing ⅛ ounce.

48. Comparison of Sets With Different Number of Eyes:

A—1 ounce pieces with one eye in each; B—1 ounce pieces with three eyes in each; C—1 ounce pieces with five eyes in each.

49. Comparison of Different Number of Pieces in the Hills:

A—2 ounce potatoes, one whole potato in each hill; B—2 ounce potatoes, two half potatoes in each hill; C—2 ounce potatoes, four quarter potatoes in each hill.

Representing Different Pasture Mixtures, With Weights Sown Per Acre.

50. Annual Pasture Mixture:

Oats (51 lbs.); Early Amber Sugar Cane (30 lbs.); Common Red Clover (7 lbs.)

51. Pasture for Seeding with Spring Crops:

Orchard Grass (3 lbs.); Meadow Fescue (3 lbs.); Timothy (3 lbs.); Alsike Clover (3 lbs.); Common Red Clover (6 lbs.).

52. Permanent Pasture:—To be sown with Barley as a nurse crop.

Orchard Grass (4 lbs.); Tall Fescue or Meadow Fescue (4 lbs.); Tall Oat Grass (3 lbs.); Meadow Foxtail (2 lbs.); Timothy (2 lbs.); Lucerne or Alfalfa (5 lbs.); Alsike Clover (2 lbs.); White Clover (2 lbs.).

53. Testing the Values of Seeds of Different Qualities:

A sample of seed wheat graded into (1) large plump, (2) small plump, (3) shrivelled and (4) broken; planting two rows of each, and comparing the percentage of germination, rates of germination, and subsequent growth.

54. Representing a Three Year Rotation of Crops:

By sowing a crop of barley mixed with clover and indicating the succession of crops on a sign, *e.g.*, 1909 Barley (grain); 1910 Clover (hay); 1911 Corn (cultivated crop).

55. Inoculation of Clover Seed With Nitro-Culture:

Sowing one half the plot with clover seed that has been inoculated with culture procured from the Bacteriological Department and the other half of the plot with the same kind of seed but untreated. The comparison will be made by counting the nodules on the plants as well as measuring the relative growths.

Representing Common Vegetables Arranged in Their Natural Orders.

Cruciferae (Cress Family):

56. A—Cabbage, Cauliflower, Broccoli, Brussels Sprouts, Kohl Rabi, Kale, Swedish Turnips.
57. B—Horse Radish, Garden Cress, Radish (Globe, Long, Winter), Pepper Root, (from woods).

58. LEGUMINOSAE (PULSE FAMILY):
Kidney Beans, Lima Beans, Windsor Beans, Scarlet Runner, Peas (Tall and Dwarf), Peanuts.

59. SOLANACEAE ORDER (NIGHTSHADE FAMILY):
Tomato, Potato, Egg Plant, Red Pepper, Ground Cherry or Strawberry Tomato.

60. COMPOSITAE (COMPOSITE FAMILY):
Salsify, Lettuce, Endive, Artichoke.

61. LILIACEAE (LILY FAMILY):
Asparagus, Garlic, Leek, Chives, Shallot, Onion.

62. CUCURBITACEAE (GOURD FAMILY):
Gourds (Mock Oranges, etc.), Bottle Gourd (Calabash), Pumpkin, Squash, Watermelon, Cucumber, Gherkin.

63. CHENOPODIACEAE (GOOSEFOOT FAMILY):
Beets (Globe and Long), Sugar Beet, Mangel-wurzel, Swiss Chard, Spinach.

64. UMBELLIFERAE (PARSLEY FAMILY):
Caraway, Parsley, Common Fennel, Celery, Parsnip, Chervil.

LABIATAE (MINT FAMILY)—AN HERB GARDEN:
65. A—Sweet Basil, Lavender, Mint, Hyssop, Savory, Sweet Marjoram.
66. B—Thyme, Sage, Rosemary, Catmint, Horehound, Jerusalem Sage, Balm.

67. VEGETABLES FOR SALADS:
Lettuce, Radish, Cress, Endive, Onions.

68. MEDICINAL PLANTS:
Castor Oil Plant, Horehound, Opium, Poppy, Tansy, Wormwood.

Representing Common Garden Flowers.

In this work much of the observation of flowers and full grown plants will need to be made in the College flower borders. Students will, however, be able to study the development of the plant from the seed and take away seedlings for further growing. In some cases roots of perennials may be secured from the Horticultural Department.

69. RANUNCULACEAE (CROWFOOT FAMILY):
Clematis, Double Buttercup, Columbine, Larkspur, Monkshood, Peony, Fennel Flower (Love in a Mist).

70. CRUCIFERAE (CRESS FAMILY):
Common Honesty, Stock or Gillyflower, Alyssum, Wallflower, Rocket, Candytuft.

71. SOLANACEAE (NIGHTSHADE FAMILY):
Petunia, Tobacco, Schizanthus (Butterfly Flower), Salpiglossis.

72. PAPAVERACEAE (POPPY FAMILY):
Celandine, Bloodroot, (from woods), Californian Poppy, Iceland Poppy, Common Opium Poppy, Oriental Poppy.

73. GERANIACEAE (GERANIUM FAMILY):
Oxalis (Shamrock), Common Scarlet Geranium, Lady Washington Geraniums, Nasturtium, Balsam.

74. SCROPHULARIACEAE (FIGWORT FAMILY) AND CAMPANULACEAE (CAMPANULA FAMILY):
Antirrhinum (Snap Dragon), Digitalis (Foxglove), Campanula (Canterbury Bells).

COMPOSITAE (COMPOSITE FAMILY):
75. A—English Daisy, Aster, Garden Zinnia, Sunflower, Dahlia, Coreopsis, (Calliopsis).
76. B—Gaillardia, Chamomile, Chrysanthemum, Pot Marigold, Centaurea (Cornflower), Cosmos.

77. MISCELLANEOUS:
A—Pansy, Pinks, Forget-Me-Not, Portulaca, Bleeding Heart.
78. B—Phlox, Heliotrope, Verbena, Periwinkle, Cockscomb.
79. C—Iris, Canna.

80. WILD FLOWER GARDEN:
Hepatica, Violets, Meadow Rue, May Apple, Baneberry, Trillium, etc. These might be planted alongside a fence or in a shaded place.

81. WILD FERN PLOT:
Might be planted in shaded corner of school grounds or along the fence.

Representing the Propagation of Fruits.

82. FRUIT TREE SEEDLINGS:
Seedling raised from seed of Apple, Peach, Cherry, Plum, Pear.

83. NURSERY STOCK OF DIFFERENT GRADES:
Illustrating the different grades of stock sold by nurserymen. The material will be furnished by the Horticultural Department.

84. GRAFTED AND BUDDED SEEDLINGS:
Illustrating the propagation of Fruit Trees by grafting and budding on seedlings.

85. PROPAGATION OF SMALL FRUITS:
Cuttings of Gooseberries, Currants, Raspberries, Grapes, Strawberries.

Representing Forest and Shade Trees.

86. SEEDLINGS FROM WOODS:
Cedar, Beech, Basswood, Elms, etc.

87. NUT TREES AND OAKS:
Hickories, Butternut, Walnut, Chestnut, Oaks.

88. MAPLES:
Different species as in the Union Schools' Experiment.

89. CONIFERS:
Pines, Cedar, Spruces, etc., grown from seed.

MISCELLANEOUS:
90. A—Elms, Ashes, Birches, Cherry.
91. B—Catalpa, Tulip, Basswood, Horse Chestnut, Locust.

Miscellaneous Plots.

92. COMMON CLIMBING PLANTS:
Pole Bean, Scarlet Runner, Hops, Morning Glory, Wild Cucumber, Climbing Nasturtium, Cobea, Cypress Vine.

93. FALLOW GROUND:
Allowing the plot to lie fallow and produce plants from such seeds as may sprout; noting the number and species of the plants but not permitting weeds to seed.

94. THE EFFECTS OF COMMERCIAL FERTILIZER (SODIUM NITRATE) IN GROWING CABBAGE:
Treating Cabbage plants with small and repeated applications of Sodium Nitrate. Growing the same number and kind of plants on one half the plot, without applying the Nitrate.

COMPARISON OF THE GROWTH AND YIELD OF SPRAYED AND UNSPRAYED POTATOES:
95. A—Spraying the plants with Bordeaux Mixture as recommended for ordinary potato culture to keep down the growth of Potato Blights.
96. B.—The same number of hills and the same kind of seed as in A, but leaving the plants unsprayed.

97. TO SET UP AND CARE FOR A HOT BED:
Use the bed for forcing any plants that may be required by other students. Keep a record of the temperature with maximum and minimum thermometers.

Special interest seemed to be aroused over the experimental plots with potatoes. The results are given for them. They show the possibilities of even small plots in the school garden. These experiments will be continued.

EXPERIMENT 46.—TO COMPARE THE YIELDS OF POTATO "SEED" OF DIFFERENT SIZES.
(Four hills of each weight were planted in 5 ft. x 10 ft. plot.)

Weight of seed.	No. of potatoes.	Weights.	Total weight.
2 ozs..................	17 small 13 large	6 ozs. 30 ozs.	36 ozs.
4 ozs..................	21 small 21 large	8 ozs. 41½ ozs.	49½ ozs.
8 ozs..................	12 small 19 large	5½ ozs. 52 ozs.	57½ ozs.

EXPERIMENT 47.—TO FIND THE RESULT OF PLANTING PIECES OF POTATOES OF DIFFERENT WEIGHTS, BUT WITH ONE EYE EACH.

Size of sets.	Product.	Weights.	Total.
⅛ oz..................	3 small 4 large	¼ oz. 3¼ oz.	3½ oz.
½ oz..................	5 small 7 large	½ oz. 16½ oz.	17 oz.
2 oz..................	8 small 16 large	½ oz. 33½ oz.	34 oz.

EXPERIMENT 48.—TO COMPARE THE YIELDS OF PIECES OF THE SAME WEIGHT, BUT WITH DIFFERENT NUMBERS OF EYES.

Size of piece.	No. of potatoes.	Weight.
1 oz.—one eye......................	1 small 12 large	35¾ ozs.
1 oz.—three eyes	6 small 11 large	35¾ ozs.
1 oz.—five eyes....................	3 small 13 large	41 ozs.

EXPERIMENT 49.—TO FIND IF CUTTING UP EQUAL SIZED POTATOES INTO DIFFERENT NUMBERS OF PIECES MAKES A DIFFERENCE IN THE YIELD

Size of Seed.	Yield.
2 oz.—one piece...	27¾ ozs.
2 oz.—two pieces..	31½ ozs.
2 oz.—four pieces...	31½ ozs.

In order to bring the work to the attention of visitors to the College and also to make it understood by those who might walk amongst the plots and not see their significance, explanation placards were placed here and there. For the cut these were photographed close together in a row.

The Department of Education seeks to encourage Gardening in the village and rural schools of the Province by offering a grant of $50 towards the initial expense of buying land, fencing, etc., and $30 annually for upkeep, provided a teacher holding a certificate in Agriculture is employed and carries out a scheme of instruction successfully. To such a teacher a personal grant of $30 is paid annually.

III.—BOTANY. (20 lessons).

1. *Economic plants :* Examination, description, and classification of common garden, field, and forest plants.

2. *Weeds:* Provincial Laws, Seed Control Act, Study and indentification of the seeds of common weeds. Collection.

Practical lessons in Plant propagation.

3. *Plant Diseases:* Study and identification of common fruit, vegetable and grain diseases; laws regarding Barberry, Black Knot, etc.; application of preventives and remedies. Collection.

4. *Experimental:* Students will be assigned simple experiments in plant physiology from the subjects listed below. These experiments they will demonstrate before the class:

(*a*) *The Seed:* Testing the vitality; determining the condition necessary for germination; how the seedling becomes established.

(*b*) *The Root:* How roots grow, their function; how they absorb food and water; proof of their using air and giving out carbon dioxide; quantity of water absorbed.

(*c*) *The Leaf:* The function of leaves, control and measure of transpiration; respiration; starch formation; behavior in light and darkness.

(*d*) *The Stem and Buds:* Forms, structures and functions of stem and buds; influence of temperature, moisture, light on growth; how the sap circulates.

(*e*) *The Flower and Fruit:* The functions of the parts of flowers; causes controlling the opening and closing of flowers; pollination; formation of fruits; devices for protecting and disseminating seeds; cross fertilization; plant breeding in experimental plots.

Instructors: Messrs. Howitt, Eastham and McCready.

This subject was one of those emphasized most as it is of fundamental importance in Agriculture, Horticulture and School Gardening. A treatment different from that ordinarily used in courses in Botany was attempted. It was carried out rather upon Nature Study lines than upon a strictly scientific basis. A practical acquaintanceship with common things was made amongst the weeds and weed seeds, trees, garden plants, field plants, and plant diseases. The ability to see and recognize was taught and tested. Text books were largely disregarded as were formal botanical classifications. The questions of what the plant was doing, what it was for, what the conditions pertaining to its welfare were, and how its life history could be demonstrated in school garden work were the important questions. Garden plants grown for their beauty did not monopolize attention; weeds, grains, vegetables received their due share.

In the experimental or physiological branch of the study, a complete set of simple exercises, treating of seeds and seedlings, growth in relation to the soil, to moisture, temperature, plant substance, reproduction, etc., was worked out by each student following out one exercise and teaching it to her classmates with practical demonstration of her methods in carrying out the work. All the exercises were such as might be taken with school children in connection with garden studies.

Potato Experiment.

The following record by one of the teachers will illustrate the character of the problems and the method of recording the work.

Problem: My problem was to determine the amount of water in plants.

What was done: A.—I cut a quantity of green timothy, such as is used for hay, and weighed it. Then I dried it in the air and sun, and weighed again.

B.—I cut a quantity of green timothy, such as is used for hay, and weighed it. Then I subjected it to an oven heat of about 110 degrees C. to 120 degrees C. for a number of hours and weighed again.

What was seen: A.—Weight of green timothy,......	16.2 grams.
Weight of dry timothy,........	5.1 grams.
Loss of weight,..............	11.1 grams.
Percentage loss of weight,....	$\frac{11.1}{16.2} \times 100 = 68.52.$

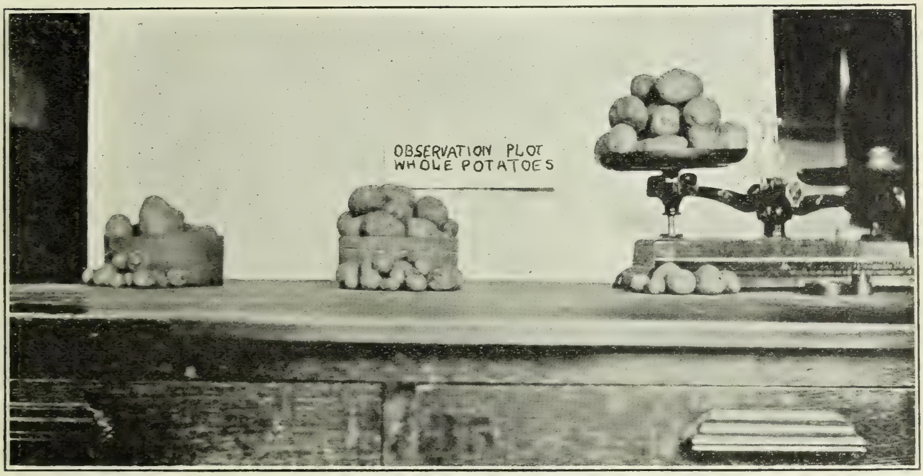
B.—Weight of green timothy,......	16.5 grams.
Weight of dry timothy,........	4.3 grams.
Loss of weight,.............	12.2 grams
Percentage loss of weight,.....	$\frac{12.2}{16.5} \times 100 = 73\ 61$

What was learned: A.—About 68.52 per cent. of this grass is water. That is, water that is loosely held and can be driven off by means of the sun and air.

B.—About 73.61 per cent. of water can be driven off by means of heat of about 110 degrees C.

IV.—Horticulture. (20 lessons).

1. *Fruit-growing* (4 lessons): Development, importance, needs, and outlook for the fruit industry; Governmental interest and action regarding shipping, marking, cold-storage, fumigation of nursery stock; experimental stations; co-operation in shipping; adaptation of various fruits to school garden work; arrangement and planting of the same; nursery practice in the propagation of trees and plants; principles of orchard management; pruning; spraying; cultivation.



Potato Experiment.

2. *Vegetable Gardening* (4 lessons): Choice of vegetables for school gardens; preparation of soils; testing and planting of seeds; general care and cultivation; preparation and use of hot-beds and cold-frames; use of tools and implements.

3. *Landscape Gardening* (4 lessons): The principles of landscape gardening in relation to the laying out and beautifying of school and home grounds, including a practical study of the trees, shrubs, and ornamental features on the College campus and neighbouring school and home grounds.

4. *Floriculture* (8 lessons): Propagation and care of house and window plants; preparation of potting soils; bulb culture; making and planting of flower beds, annual and perennial borders.

Instructors—Messrs. Hutt, Crowe, Hunt.

As with the other subjects, the instruction in this was of a practical character. Every student in the class was taught and shown what good orcharding and gardening means, what to do and how to do it in the improvement and decoration of the school grounds; how to propagate common plants from cuttings, etc.; many of the lessons had practical demonstrations in the school garden in plots showing samples of nursery stock of different kinds and ages, and strawberry propagation; the growing of seedling plums, peaches, apples, etc.

Lack of space prevents the detailing of all the subjects taken up in the course. The remaining subjects were treated in the same practical comprehensive way as those described above. From reports received from teachers these subjects are finding application in their teaching of their children, or in their associations with their pupils' parents.

V.—Field Husbandry. (20 lessons).—Importance of field crops in the national economy; systems of farming; rotation of crops; fertility of soil; cultivation of the land; classes of farm crops; uses of farm crops; varieties of farm crops; selection of plants; selection of seeds; improvements of crops by means of selection and hybridisation; practical tests in connection with Experimental Union; study of work being done in experiments with farm crops in Canada and in the United States.

Examination of field crops on neighboring farms; the work on the experimental plots; farm crops in the school garden; the agricultural museum; laboratory study of the root development of farm crops; types of seeds of grains, grasses, clovers, roots and fodder crops.

Instructor.— Prof. C. A. Zavitz.

VI.—Physics. (20 lessons).—Application of physics in farming; nature of soils, soil moisture, heat and air; principles of tillage and systems of drainage and cultivation; measurements of fields with the chain; identification of samples of soils; principles of common farm machines; meteorological records.

Instructors.—Prof. W. H. Day and Mr. R. R. Graham.

VII.—Entomology. (20 lessons).—Losses through insects in agriculture and horticulture; Governmental interest; classification of insects and laboratory study of types; common beneficial and noxious insects; out-of-door study and collecting in field, garden, orchard and forest; insecticides; a collection of insects properly mounted and labelled is required. Work of the Entomological Society of Ontario and the organization of local clubs in connection with it.

Instructors.—Dr. Bethune and Mr. Jarvis.

VIII.—Animal Husbandry. (5 lessons).—Development, importance, status of the industry in Ontario; histories and characteristics of principal breeds of live stock; types; stabling and care. Study of College stables and herds; exercises in judging with score cards.

Instructor.—Prof. G. E. Day.

IX.—Dairy Husbandry. (5 lessons).—Development, importance, needs, outlook, Governmental interest and action; markets and competition. Dairy breeds, care and stabling; individual cow-testing; care of milk and cream.

Observation of the process of Cheddar cheese making, curing, boxing, labelling, shipping.

Observation of the process of butter making, printing, shipping; milk-testing with lactometer and Babcock test; milk separation with hand separator.

Instructor.—Prof. Dean.

X.—Poultry. (5 lessons).—Development and importance of poultry industry in Canada; markets and competition; Governmental interest and action. Common breeds; feeding, housing; incubation; individual testing by trap nest; preservation of eggs.

Observation of natural and artificial hatching of chicks; care of young in brooders, feeding, etc.

Instructor.—Prof. Graham.

XI.—Chemistry. (10 lessons).—Agricultural Chemistry: Plant growth and composition, soils; manures and fertilizers.

Chemistry of foods: The chemistry of the food principles, *i.e.*, Protein, fat, carbohydrates and mineral matter; the function of these in the body, and the general characteristics of the different classes of foods. Simple experiments, such as might be carried on in public schools.

Instructors.—Profs. Harcourt and Gamble.

XII.—Bacteriology. (10 lessons).—Lectures and demonstrations exemplifying the work of bacteria in soil, dairying, plant and animal diseases; Government regulations regarding tuberculin tests, killing of diseased cattle, stamping out of hog cholera, meat inspection, etc. An experiment on soil inoculation in the school garden.

Instructors.—Prof. Edwards and Mr. D. H. Jones.

XIII.—Forestry. (5 lessons).—Development of forestry work in other countries; value of lumbering industry; Canada's conditions and needs; laws and regulations regarding re-forestation and forest preservation; the establishment, care and protection of wood lots.

Identification of our forest trees; planting seed-beds in school gardens; work in College nursery and in the experimental bush; collection of weeds, etc.

Instructor.—Prof. E. J. Zavitz.

XIV.—Farm Carpentry, Etc.. (12 lessons).—Exercises in making articles needed in garden work, such as garden stakes and germination boxes. Instruction in the care of tools and the general repairing to be done about a school or home, such as cutting glass, puttying, painting, sharpening tools, inserting handles, mending gates and fences. Instruction in making working drawings of simple articles and the interpretation of such as are found in agricultural papers and farmers' bulletins illustrating farm buildings and utensils. Observation of approved and up-to-date methods of stabling, fencing, road-making, supplying water, etc.

AGRICULTURE IN THE SCHOOLS
rural and village schools
undertaking this work.
AGRICULTURE IN THE SCHOOLS
Commence the work next
year with a few
Experimental Class Plots.
AGRICULTURE IN THE SCHOOLS
Twelve plots representing the
work arranged for the
Schools of Ontario
by the Experimental Union
Schools Division.
AGRICULTURE IN THE SCHOOLS

Signs for making work understood.

While this last subject could not be taken up under Prof. Evans, owing to his being fully occupied with the class in Industrial Arts, the matter was not lost sight of. The laboratory work bench and kit of tools were made of considerable use in the dozen and one needs of school gardening equipment and operations. While no systematic instruction was given, many learned little lessons in "doing things" —a very necessary ability where practical studies are to be joined with school work. The new regulations of the Department of Education encourages the provision of work bench and tools as a part of the equipment of country schools.

In the class excursions attention was always called to up-to-date improvements in farm machinery or other equipment.

In all these subjects the same general plans for making the instruction of a practical nature were employed. As nearly all the teachers had been brought up in the country and had taught in the country, they were well informed regarding almost all phases of farm work or farm interests. They were possessed of a good intellectual foundation for receiving new ideas and suggestions readily.

ENGLISH.

In addition to the subjects outlined in the official circular, a short course of lectures was given by Prof. Reynolds.

These were taken in the evenings and covered the following topics:

The Literature of Nature and Science Contrasted; Nature in Literature; Wordsworth's and Tennyson's Interpretation of Nature; Canadian Poets; other Canadian authors; the best books for rural school libraries.

In addition a lecture on the Drama was given by Professor Alexander, of Toronto University, and a recital of Shakespearian selections by Miss Field of the Toronto Conservatory of Music.

EXAMINATIONS.

There was no formal written examinations at the close of the term. The experiment of doing without them was tried. It was felt that the putting of written examination tests on the instruction of ten weeks would cramp the work and spoil any inspirational effects that might result from having one taste of school work free of written tests. It was felt moreover that the instructors should be spared this work if possible.

Instead, the practical and recorded work of the term, collections and practical and oral examinations were the means used for grading in proficiency and adjudging whether candidates merited certificates. They were marked for the following:

Collections: (1) Plants, (2) Insects, (3) Seeds, (4) Weed Seeds.

Records: (1) Science Note Books, (2) Garden Journals, (3) Portfolios of Lecture Outlines.

Practical Examinations: (1) Identification of Plants, (2) Identification of Weed Seeds, (3) Demonstration of Physiological Experiment in Botany, (4) Garden Practice throughout the term.

Oral Examinations: Final review of all the work.

Conduct: (1) Regularity and Punctuality; (2) Application to study and demeanor in residence.

On the whole, this scheme of examination was found satisfactory.

If the more exact determination of the student's knowledge should be thought necessary written tests would need to be imposed. Great care would need to be exercised in the setting of such papers, however.

THE MEASURE OF THE VALUE OF THE COURSE.

The teachers have not been sent away all-wise in the Art and Science of Agriculture and Horticulture. But they have been made, it is hoped, all alive to the problems and possibilities that await and surround the boys and girls who become their pupils. The good they may do will not be so much from the addition to their wisdom as to the increase of their sympathy and power to see and seize opportunities for directing and encouraging efforts to *do* something and *be* something.

THE USE OF THE TRAINING FROM THE TEACHER'S STANDPOINT.

It is hardly possible at this stage of the experiment in teacher-training to measure its success or failure. The final test must be its efficacy in stirring boys and girls in the country to better thinking, feeling, and doing. It is a success in that the instruction received here is usable. Teachers are putting their instruction to practical use; not likely always with equal effect, but each in her own way according to her opportunity and ability. Some of them have voluntarily reported in the matter and excerpts from their letters are given to show the trend of the work and its possibilities in the hands of trained teachers:

"Every morning I take the first fifteen or twenty minutes for Nature Study. This fall we have obtained and identified the common weeds and wild flowers, besides observing, describing and naming the birds. . . . The third and fourth class have collected and mounted the weeds and wild flowers, the second class are making a collection of weed seeds. . . . Just now we are studying the apple crop—varieties, uses, value and exportation. . . . Everyone remarks on the interest taken by the pupils. Of course the work is new to them, but as yet I see no abatement of interest. . . . Since August we have bought some good reference books: *How to Know the Wild Flowers*, *How to Name the Birds*, *The Soil*, and Comstock's *Manual for the Study of Insects*, and several others, which have been of great value in our identification work. . . . . The instruction I received in the various Departments of the College has been invaluable to me both personally and professionally. . . . Our Inspector is very anxious that we have a school garden next spring. . . ."—*Elgin Co.*

Weed seed studies.

"My pupils are busy just now with weed seed collecting. I procured an armful of cardboard boxes and a tinsmith's punch. They each cut out two rectangles 5 in. x 7 in. and punched holes in one of them; then pasted the two together (this is for mounting the seeds). Punching was done at recess and before nine. Before punching I had them draw a plan on paper and then on the cardboard, requiring them to be very careful in measurements. This was their first Manual Training lesson. I have the glass and passepartout ready for them when the seeds are mounted. We are having a weed seed competition some day soon, and are going to have the miller, who lives near, as judge. . . . We had a lesson on apples lately. . . . None of them had ever seen grafting or budding done. Some hadn't heard of such a thing. There are two crabapple trees in the playground. We are planning to have a man come next spring and give them a demonstration in grafting right on the grounds. . . . The trustees are taking the matter of School Gardening into consideration. The playground is rocky, etc."—*Lanark Co.*

"My course at Guelph has assisted me so much in my teaching that I thought it only fair to mention some methods I have adopted since commencing my duties in my little country school.

"Every morning directly after devotional exercises we have our observation talks, which sometimes last for half an hour. This is our plan:

1. *Date*—Tuesday, Oct. 12th.
2. *Kind of Day*—Bright and cool.
3. *Wind*—West
4. *Sky*—Blue and white.
5. *Temperature*—40°.
6.—*Remarks*—(1) Farmers hauling hay to town.
(2) Fall apples are being taken to town.
(3) Farmers are hauling in buckwheat.
(4) To-day we had our first snow-storm for this fall.

"It is surprising how much the children enjoy these talks, and I have gained a lot of information myself. All farm operations, migrations of birds, current events, etc., are kept track of in the remarks. This exercise seems to brighten up the whole morning. Events such as Lieutenant Shackleton's trip and England's construction of new warships have been discussed, and the children have brought pictures illustrating these topics and these are put on the wall.

"In the early fall we collected weeds and pressed and mounted them, and these are up for inspection. The seeds of these weeds were also collected and put in envelopes, and they are up for inspection. My inspector was delighted with their work. I hope to have a school garden in the spring.

"My greatest drawback is the lack of a school library, and so far have not been able to persuade the trustees to secure one. I am going to keep at it, however.

"If all is well I intend taking advantage of the summer course next year."—*Waterloo Co.*

"I have, with the trustee's consent, started a school garden. We are intending to have one 25 ft. x 14 ft., and would like to plant varieties of winter wheat this fall. Would you furnish us with some of the best varieties? . . . One of the trustees suggests putting some of those in and also some the children are bringing from home."—*Wentworth Co.*

(Selected samples of the best four varieties produced at the College were sent.)

"The children are already gathering seeds and planning for our garden. Just the other day I had a weed test. I told the children to bring to school on Friday as many weeds as they could see on the way to school. All told, we had fifty different weeds. The fourth class knew from 47-50, and one little girl in the Part II. knew 46. No one went below 26.—*Wellington Co.*

"The pupils are ignorant of the common birds, weeds, trees, etc., so the Nature Study lessons are a source of great delight to them. . . . I am almost certain that the School Garden will be a success, for all in the section seem in sympathy with the project."—*Brant Co.*

"The pupils in this school had practically no instruction in Nature Study, so there are very many things they are anxious to know about. I expected to have difficulty in arousing their interest in it, but am happily disappointed. There is scarcely a morning that they do not have something interesting to bring to school. There are a great number of worms like the one enclosed, about which we are curious. We would like to know what they are."—*Welland Co.*

"We have been taking from fifteen minutes to half an hour each day. The children seem much interested in weeds, etc. We have not made provision for a garden yet. . . . . I think the size of the playground would warrant breaking up a part of it for an experiment along that line."—*Lincoln Co.*

The *Farmer's Advocate,* London, has been making some independent enquiries amongst the members of the class. The teachers were asked their opinions regarding the value of the training so far as it affected their teaching and whether the teaching of elementary agriculture and horticulture was feasible and worth while.

Remembering that all the teachers had had previous experience in teaching (and mostly in country schools) their answers are deserving of weight as to the possibilities of the work from the teacher's standpoint.

"Editor *The Farmer's Advocate:* In reply to your very enthusiastic letter of September 28th, I shall endeavor, as best I can, to make reply to your questions. If my feeble attempts should be of any value in following up the new movement *re* the improvement of rural education I shall be pleased.

"1. The course at the O. A. C. has quite considerably changed my pedagogical viewpoint as a rural teacher by enabling me to understand better, each day, that the only true way to educate rural school children is by bringing the children into touch with the common and interesting things about them, so that they may understand *why they do things.* It has enabled me to feel that we, as teachers, have many great difficulties to overcome, in the way of enabling the parents in our various communities to understand what it is to truly educate their children, so that they may not scorn the busy farmer, but be ready to do, and find out.

"2. I believe the chief thing of value in the course has been its enabling me to understand, myself, the true principles upon which the real teaching of agriculture and the study of nature rests, so that I can better find out and open up new ideas in the methods of imparting such knowledge to the country boy or girl, by enabling them to do with their own hands, to see and find out.

Cc-operation School Gardening.
Section cf Boys' Garden after vacation August 18th, 1909.
Cape Croker School, Indian Reserve, Bruce Co.

"3. I do think the teaching of agriculture, or, as you state, the introduction of school-gardening, to be feasible and desirable.

"4. In the teaching of agriculture I find so many ideas crowding up into my mind *re* subjects interesting and helpful to be taught that I scarcely know which topic to make use of. The teaching of it is much easier than any such teaching formerly was.

"5. Since the opening of the term, I have generally taken a few minutes in the morning for reports on observations, or for discussion of something of interest which has been previously reported. Also, I take special lessons on plant and animal life, and some injurious insects affecting various crops. Then, too, the children and I have collected caterpillars, and made a suitable case in which to keep them over winter, daily observations being made on these.

"In regard to school-gardening, I have been discussing the matter with my trustees, with the parents whom I have met, and also with the Inspector, and I am trying to enable the people of the community to understand the value of having such work done at school. Now, I feel that I shall succeed in having the ground prepared this fall for a small garden next year.

"6. There are difficulties, the greatest being to enable the parents and trustees to understand the value of the school garden, and thus to consent to preparing even a part of the school-yard for the work. They are afraid to put any money into extra land for a school garden. To many people, new ideas are worthless.

"7. One suggestion I might make is that I think more of the work of teachers-in-training should be made to bear on such work, and thus ideas should be correlated; also, that the teachers should be given the best opportunities possible in the way of conveniences and helpful instructions while they are preparing for such work. I think it would be excellent to have a Normal School in connection with the Agricultural College, so that the teachers-in-training might practise the methods which they think would be best to adopt with children.

"Hoping my rather few disconnected ideas may be of some value to you, and that I may be able to make advancement along those lines as I continue the work."—*A Teacher, Southern Ontario.*

"Dear Sirs,—In reply to your favor of September 28th, I may say that while I have always thought that the instruction in country schools should be along practical lines, and of a broad nature, yet the course we received at the O. A. C. changed my viewpoint considerably. I think now that for those children who intend to remain in the country a special course in agriculture should be taken. If the child can be brought to a realization of the scientific basis of good farming, later his results will be better, his work more interesting, and his life pleasanter.

"As there is no better place for the teacher to fully realize all the possibilities of life on a farm than at the O. A. C., I think it would be very wise to have a Normal School in connection with it.

"The chief thing of value to me was coming in close contact with farming carried on scientifically."—*Teacher, Eastern Ontario.*

"The most valuable thing in the teachers' course at Guelph was the very close observation we were taught to use, and the habit of giving reasons for everything."

She considers the teaching of agriculture, nature study, etc., in the public schools, to be both feasible and desirable, but admits that she does not find teaching these things easy, because she does not know enough herself about "soil chemistry and physics." That she is trying to do her best, however, is evident from the concluding portion of her letter:

"I am trying to train the children to know more about their cattle, and apples, and trees and weeds surrounding us. They are interested and pleased.

"My difficulties lie in a lack of knowledge on my own account.

"For the length of time—10 weeks—the course at Guelph could not be better, nor carried out in a better way. For my own part, I need more time before I could teach agriculture successfully."—*Teacher, Wentworth Co.*

Teachers' Certificate in Agriculture.

The Department of Education now issues the certificates to teachers qualifying them for service in School Gardening and the teaching of Elementary Agriculture and Horticulture. The ninety-two teachers graduated in the spring Normal Class received this certificate. It was previously granted to Mr. E. A. Howes, Macdonald Consolidated School, Guelph; Mr. P. H. Buchanan, Marden, and Mr. W. W. Pettapiece, North Gower, these three being the first to receive it in the Province. These gentlemen had completed courses at the College and afterwards carried on successful school gardens.

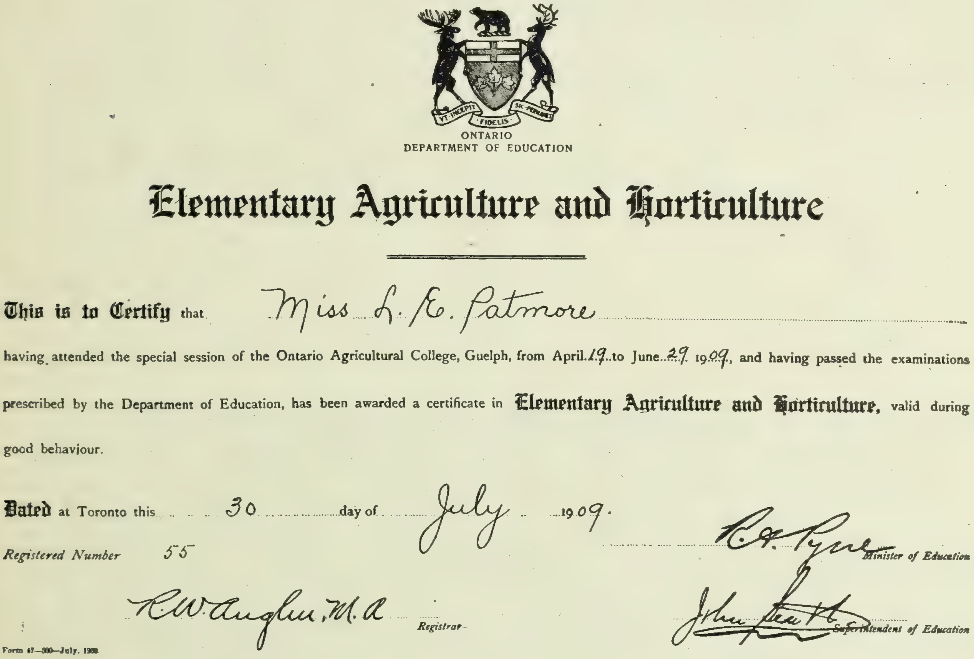
Under the revised regulations (July, 1909) of the Department of Education, holders of this qualification are entitled to special grants. Provided they carry out a course of instruction in Elementary Agriculture and Horticulture through a successfully conducted School Garden they receive a direct personal grant of $30 per annum. The Board of Trustees employing such teacher receives also $30 per annum as an extra grant to be applied in this special work, and to assist them to commence the work a grant not exceeding $50 may be made to provide extra land, fencing, etc.

It is likely that quite a number of gardens will be commenced throughout the Province next spring by the teachers who have received certificates. It is not expected that all will engage in the work. Some of them are employed in schools where trustees do not wish to undertake gardens at present.

SUMMER SCHOOL FOR TEACHERS, JULY, 1909.

The class attending the Summer School for Teachers in July of this year was the largest that has entered for this work during the six years it has been carried on. This increase in numbers marks in some measure a livelier interest amongst the teachers of the Province in the necessity for giving instruction to children along manual and vocational lines.

The work was carried out with the support and direction of the Department of Education. The Department officially encourages teachers to undertake this special training by granting certificates to successful students. No tuition fees were charged, except to teachers non-resident in Ontario. For the four weeks' board at Macdonald Hall, a charge of $15.00 was made. The cost of the course, compared with that at many other summer schools is very small.



ONTARIO
DEPARTMENT OF EDUCATION

Elementary Agriculture and Horticulture

This is to Certify that Miss L. E. Patmore

having attended the special session of the Ontario Agricultural College, Guelph, from April 19 to June 29 1909, and having passed the examinations prescribed by the Department of Education, has been awarded a certificate in **Elementary Agriculture and Horticulture**, valid during good behaviour.

Dated at Toronto this 30 day of July 1909.

Registered Number 55

R. A. Pyne *Minister of Education*

R. W. Anglin, M.A. *Registrar*

John Seath *Superintendent of Education*

Form 47—500—July, 1909

Instruction was given in two Courses, viz.: 1.—*Nature Study.* II.—*Elementary Agriculture and Horticulture.*

AGRICULTURE AND NATURE STUDY.

July Course in Nature Study. Fifty-three students took the Course in Nature Study. Most of them were from city and town schools, but the country schools were well represented too, there being more rural teachers in the class than in any previous year. The work was arranged so as to be an introduction to a second year's course in Elementary Agriculture. It included practical instruction in School

Gardening, Plant Propagation, the Identification of Weeds and Weed Seeds, Trees, Birds, Insects and Garden Plants. Lectures and demonstrations were given on farm animals and poultry, dairying and soils. Some members of the class plan to continue special lines of the work in subsequent years.

Miss L. F. Babion, Ridgeway, Welland.
Miss H. Barmby, Caledon East, Peel.
Miss L. G. Black, Rockwood, Wellington Co.
Miss A. Card, Marden, Wellington Co.
Miss I Card, Marden, Wellington Co.
Miss M. Chapman, Campbellville, Halton Co,
Miss L. Clyde, Eberts, Kent Co.
Mr. J. Corrigill, Elmira.
Miss M. Fowler, Oakwood, Victoria Co.
Miss M. Hawkins, Canton, Durham Co.
Miss A. Hayes, Trenton.
Miss A. M. Kyle, Colquhoun, Dundas Co.
Miss L. J. McKenzie, Glenarm, Victoria.
Miss H. McLennan, Hamilton.
Miss H. Savage, "
Miss A. Shier, Sunderland, Ontario Co.
Miss N. A. M. Banting, Toronto.
Miss E. Bruce, "
Mr. J. P. Cassidy, "
Miss L. Cheer, "
Miss L. Eaton, "
Miss L. A. Fawcett, "
Miss E. Fuller, "
Miss G. Gunn, "
Miss S. Hardy, "
Miss M. J. Dalton, "
Miss J. R. Brown, "
Miss E. Harmer, "
Miss W. Hogg, "
Miss F. L. Knowles, Toronto.
Miss A. A. Malcolm, "
Miss M. D. Moffatt, "
Miss G. Robb, "
Miss M. Robb, "
Miss J. Sharpe, "
Miss E. Tedd, "
Miss E. Winn, "
Miss E. Shillinglaw, Sarnia.
Miss E. Smith, Acton, Halton Co.
Miss L. Smith, Brantford.
Miss E. Smith, Acton, Halton Co.
Miss L. Smith, Brantford.
Miss M. C. Squair, Bowmanville.
Miss H. Stanley, Balderson, Lanark Co.
Miss E. Taylor, Norfolk, Virginia, U. S. A.
Miss C. Watt, Barrie.
Mr. D. Whyte, Forest.
Miss M. Eberhardt, St. Catharines.
Miss. L. McCutcheon, Thorndale, Middlesex Co.
Miss E. McGill, Bowmanville.
Mr. E. C. Robinson, Bluevale, Huron Co.
Miss E. McGill, Bowmanville.
Mrs. E. C. Grider, Louisville, Kentucky, U.S.A.
Mr. L. Might, B.A., Simcoe.
Miss Wilson, Washington, D.C., U.S.A.

Summer School for Teachers, July, 1909.

July Course in Elementary Agriculture and Horticulture. Six teachers took this Course this summer. With the completion of a Winter Reading Course they will be entitled to a Departmental Certificate similar to that granted to the Normal teachers who take the ten weeks' Spring Course. Their work included practical instruction in Chemistry, Bacteriology, Physics, Entomology and Botany, following up the work of a previous course in Nature Study.

Miss J. Lush, Berlin.
Miss M. M. Reid, Erin, Wellington Co.
Miss E. Sann, Virgil, Lincoln Co.
Miss M. Stewart, St. Catharines.
Miss L. Waterman, Bensfort, Peterboro' Co.
Miss V. Watson, Goderich.

The attendance of city teachers was relatively large. Toronto's representation numbered twenty-one—and from one school alone there were six teachers. Contrary to what might have been expected these teachers were most interested and enthusiastic in those parts of the work that were chiefly concerned with farming interests—the crops, the cattle, the poultry, the farm work. While in one sense, our chief concern is with the training of teachers for the country schools, it is satisfactory to think that the work commends itself for use in city schools, and that through the instruction of these teachers city children may be led to understand the work and interests of dwellers in country places.

The taking of the course by several teachers from the same school must commend itself. Such a body of teachers should be able to carry out a very comprehensive non-overlapping course of Nature Study in the different grades of their school.

It would appear that for the attendance of country teachers some additional means of encuragment will have to be found. For most teachers there is no attraction in spending a considerable part of their savings (the total cost of the course will be somewhere in the neighbourhood of $25) and four of their six weeks' holidays, without receiving more return than the satisfaction of doing better work for people who will be slow to reward enhanced service.

If means could be found of giving a summer school bursary to one selected teacher in each Inspectorate as a reward for good work in an effort to give instruction in Agriculture, we could have a splendid class of the very choicest teachers. Their influence afterwards in their own districts would be inestimable. We could, maybe, have in time through them one model country school in each inspectoral district of the Province.

There were two teachers in the class concerned in the teaching of High School work, Mr. L. Might, B.A., Science Master in Simcoe H. S., and Mr. J. Corrigill, of the Elmira Continuation School. The work in the July course should commend itself highly to those who teach the sciences in our High and Continuation Schools. The programme that they have to follow is very well covered in the instruction given in Botany, Entomology, Physics and Chemistry, and much of the work is along lines in which they have not had any training.

Indeed, if all our science teachers could have the agricultural viewpoint as a directing force or tendency in their teaching, it would not be long until the country teachers who are prepared in science in the High Schools would be naturally imparting Agriculture and Nature Study in their schools. And here lies the clue for the wide introduction of Agriculture into our High Schools.

VISITS TO COUNTRY SCHOOLS.

During the fall I had the privilege of visiting a few country schools in two counties. With Inspector Day I inspected five in Simcoe County, and with Inspector Standing three in Brant County.

There is good evidence of wholesome efforts being made to advance. Trustees are seeking to improve the school property and teachers are trying to adapt their teaching to the needs and surroundings of their pupils.

I was struck anew with the marked isolation of the country teacher. She (they are nearly all women now) is the most isolated worker in the field of education. In hardly any line of work are the workers more separated. Association with fellow-workers is limited pretty much to a two days' teachers' convention, once a year, and the half yearly visits of her Inspector. She has no direct means of communication with the central educational authority, and likely knows little of the tendencies or changes of our system of education at large. Day after day she does her round of work associating only with children. She is likely to have little of the enthusiasm or aggressiveness that may be found in a body of teachers who are joined in a common cause, and working together day by day. Soon, she is likely to withdraw from the work or seek employment in graded urban schools.

Here lies one of the chief problems of the country schools: *To raise up a body of enthusiastic, organized, permanent teachers proud of their work and aggressive in it for promotion and recognition.* In some measure we hope to help in the solving of it with the issuing of the Schools' and Teachers' Bulletin; by getting them to co-operate in the School Gardening work; by training them as *Rural School Specialists.* "The rural teacher for the rural school" is one of our working mottoes.

TRAINING OF TEACHERS IN AGRICULTURE ELSEWHERE.

There are now four Normal centres for this work in Canada: The Nova Scotia Normal School at Truro, the Quebec Normal at Macdonald College, and the Manitoba Normal at Winnipeg, in addition to this College, are engaged in the work. In these Provinces every normal trained teacher comes under the influence more or less of the Agricultural Colleges. In Nova Scotia and Quebec the two schools are closely affiliated. In Manitoba the teachers spend one month in residence out at the College. Their first term opened May 11th last with an attendance of seventy-one. As in the courses here the entire time is given to the subject. Nearly every branch is touched on as shown by the time-table.

Note.—From 11 a.m. the classes will be divided into two sections, excepting in Animal Husbandry.

———		9–10	10–11	11–12	1.30–3	3–4.30
Monday	A	Horticulture	Soils.	Field Husbandry.	Botany.	Animal Husbandry.
	B			Botany.	Field Husbandry.	
Tuesday	A	Botany.	Field Husbandry.	Soils.	Horticulture	Mechanics.
	B			Horticulture	Mechanics.	Dairying.
Wednesday	A	Dairying.	Entomology.	Field Husbandry.	Botany.	Dairying.
	B			Botany.	Field Husbandry.	Mechanics.
Thursday	A	Botany.	Field Husbandry.	Horticulture	Dairying.	Animal Husbandry.
	B			Soils.	Horticulture	
Friday	A	Animal Husbandry.	Veterinary Science.	Field Husbandry.	Botany.	Mechanics.
	B			Botany.	Field Husbandry.	Dairying.

Throughout the continent the work is finding an introduction in many places, particularly through Summer Schools.

STUDENTS TAKING AGRICULTURE AND NATURE STUDY IN COLLEGE AND UNIVERSITY SUMMER SCHOOLS OR SPECIAL TEACHERS' COURSES.

——	1908.				1909.			
	Agriculture.	Nature Study.	Total.	Weeks.	Agriculture.	Nature Study.	Totals.	Weeks.
California, University of	8	......	8	6	16	......	16	6
Illinois, University of	25	......	25	9	27	......	27	9
Massachusetts A. and M. College	......	......	......	4	160	......	160	4
Michigan, A. and M. College	21	......	21	4	28	......	28	4
Minnesota, University of	70	......	70	6	76	.....	76	6
Minnesota Agricultural College	90	......	90	3	36	......	36	3
Missouri, University of	21	......	21	8	54	......	54	8
Nebraska, University of	26	......	26	6	......	......	......	6
Nebraska School of Agriculture	53	......	53	8	......	......	......	8
North Dakota Agricultural College	......	......	......	......	20	17	27	4
North Carolina A. and M. College	13	......	13	3	14	1	14	3
Ohio, State University	7	......	7	8	......	......	......	.....
Ohio, Miami University	35	90	116	6	26	40	66	6
Tennessee, University of	69	......	69	6	......	......	......	6
Virginia, University of	72	45	117	6	108	28	116	6
Wisconsin, University of	20	......	20	......	......	......	......	......
Chicago, University of	......	......	......	......	16	......	16	6
Ontario Agricultural College	19	30	49	4	6	53	59	4
Manitoba Agricultural College	......	...	......	...	71	......	71	4
Nova Scotia Agricultural College	......	......	......	6	......	......	......	6

In some cases the records have not been received.

CORRESPONDENCE.

The amount of correspondence of the department has increased considerably during the year.

There are many difficulties involved in having the department used as an Information Bureau, but many satisfactions, too. Our letter heads carry an invitation to use us, in these words: "This department is at the service of school inspectors, teachers, pupils and nature-lovers in all matters pertaining to the study of nature. Correspondence is invited regarding school-gardening, elementary agriculture, experimental work with plants, courses of study, text-books and methods of teaching. Help is offered in the study and identification of birds, insects and plants, in the preparation of nature collections, the keeping of nature records, etc." Some teachers send in material to be identified; others make inquiries about books, equipment or courses of study; pupils write under direction of their teachers to ask about birds chiefly.

Many inquiries are received from the United States regarding the teacher-training work and our extension work in School Gardening. This latter work alone has brought us into correspondence with about one hundred and fifty teachers.

O A.C. BRANCH OF THE ONTARIO TEACHERS' ALLIANCE.

In the organization of a branch of the Ontario Teachers' Alliance amongst our students an effort was made to serve another side of the teachers' interests. As a body of workers in a common field our Ontario teachers have been notoriously unorganized. This defect has been remedied recently by the commencement of the Alliance. In it the force of a combined membership is at the disposal of individual members for their protection, and the general promotion of their interests.

The O.A.C. Branch affords a centre for serving the needs of all members who may join from the teachers' classes in Domestic Science, Manual Training and Agriculture.

It was organized in June with Prof. Evans, President; Miss Bella Groves, Fergus, Vice-President; and Prof. McCready, Secretary-Treasurer. There is a membership already of about forty.

TRUSTEE ASSOCIATIONS.

Another of these Associations was organized in June of this year; this one known as the Dufferin County Trustees' Association. The Oxford County and North Wellington Associations have their membership restricted to rural trustees, but the Dufferin County Association embraces the trustees of urban schools as well. Most of the country schools (there are very few urban schools in the county) are represented in the organization. It augurs well for the progress of these schools when the trustees unite for discussion of their common interests and send representatives to the Provincial Trustee Association's Easter meeting at Toronto; the rural school will feel the benefit of the livelier interest that such measures will engender.

The teaching of Agriculture in the schools is one of the things that have been taken up at their meetings. On June 17th I dealt with this subject before the Dufferin Association at Shelburne, and on June 23rd before the North Wellington Association at Moorefield.

TEACHERS' CONVENTIONS.

Two of the best teachers' conventions that have ever been held at the College took place in June. On the 3rd and 4th the East and West Lambton Teachers' Associations met and on the 10th and 11th the East and West Kent Associations. In each case there were about two hundred teachers in attendance. They were well organized, and carried their programmes out well. Sometimes the teachers' conventions are disorganized through coming with a crowded institute excursion. In these cases there was no inconvenience or interference from such. It is suggested for other Associations that may purpose visiting the College, that they always come for two days and arrange their excursion for the last of May or first of June. By this time the school gardens of the Consolidated School and the Normal Classes are well advanced, and besides there are many opportunities at this time for outdoor studies on the campus.

The programme followed by the Lambton Associations suggests the line of work covered in such visits.

PROGRAMME.

Thursday—Afternoon.

1.30 to 3.45 p.m.—Visit to Agricultural College. Things to be seen: Dairy and Poultry Department, Massey Hall and Library, Experimental Plots, Museums.

3.45 to 4.30 p.m.—Visit to Consolidated School. Things to be seen: The Children's and Teachers' Gardens, Conveyances.

Evening.

8 p.m.—Meeting in Massey Hall. Addresses will be given by President Creelman on "Agricultural Education"; Dr. Bethune on "Common Insects"; Professor Hutt on "Improvement of School Grounds." Suitable music will be provided.

Friday—Morning.

9.00 to 10.30 a.m.—Visit to Macdonald Hall and Institute. While there Professor McCready will give an address on "School Gardening."

10.45 to 11.30 a.m.—In Massey Hall. Professor Harcourt will give an address on Chemistry of Foods."

11.30 a.m. to 12.00 noon.—Business meeting of the Associations. West Lambton Teachers will meet in Massey Hall and East Lambton Teachers in Massey Library.

Afternoon.

1.45 to 2.30 p.m.—Meeting in Massey Hall. Addresses will be given by Professor Zavitz on "Agricultural Wealth", Inspectors Conn and McDougall.

2.30 to 4.30 p.m.—Some practical Nature Studies on the campus, under the direction of Professor McCready.

For the musical and literary part of the evening entertainments we were able to use some of the talent of the Normal Class students.

During the fall I attended three conventions of teachers, and took up the question of School Gardening and the Teaching of Agriculture; the Dufferin County Convention at Shelburne on October 13th, that of the South Ontario teachers at Oshawa on October 21st, and the Brant County Convention at Brantford on October 22nd. A growing and practical interest in these matters is noticeable at these meetings.

Distribution of the O.A.C. Review in the Schools.

Two years ago free subscriptions to the College magazine were offered to such country schools as might make application for them. Last year about ninety schools received it. Owing to increases in the number of regular subscribers, it has been found necessary to restrict the term of such complimentary subscriptions to one year, and in order to ensure its best use in the school libraries it has been considered advisable to place it as far as possible through the hands of teachers who have received instruction at the College. Applications from trustees are not now accepted.

To assist in making the Review of direct interest to the teacher, arrangements have been made for the insertion each month of four pages of matter under the heading of the *Schools' and Teachers' Department*. It is proposed to have in each issue news or other matter pertaining to the work of each of the Macdonald Institute Departments, as explained in the sub-heading of the title and the foreword of the first number.

" Devoted to those interests of the Ontario Agricultural College which pertain particularly to the training of teachers for giving instruction in the schools of the Province along vocational lines—in Home Economics, Industrial Arts, Elementary Agriculture and Horticulture.

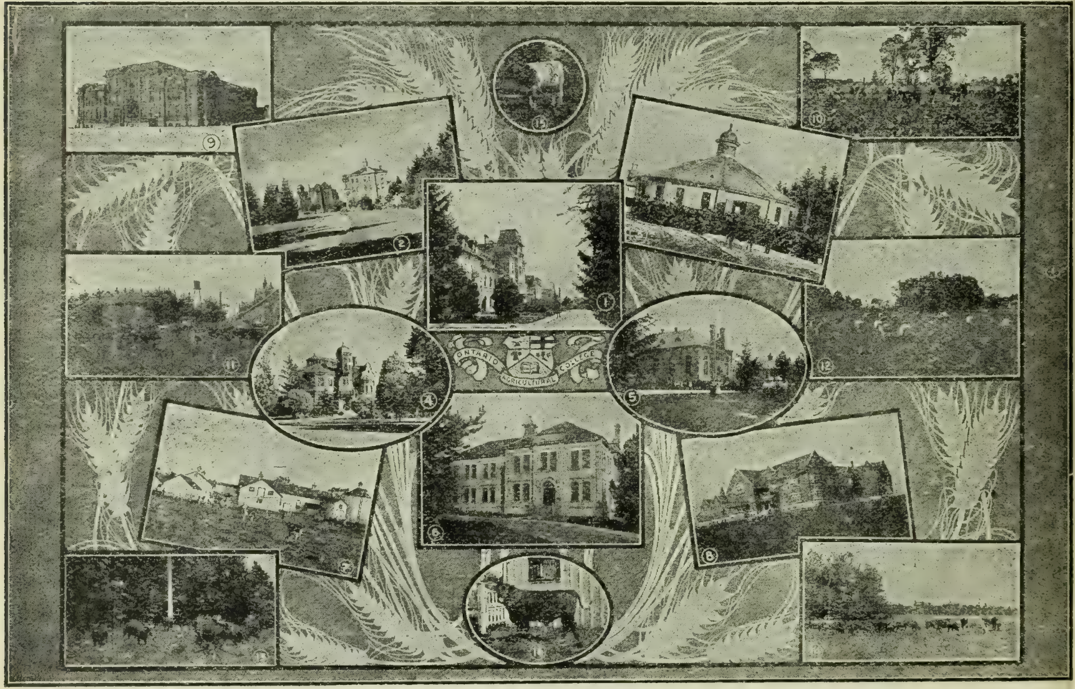
In this department of the College paper an effort will be made to hold together all our isolated workers in their scattered and several fields of endeavour; to keep open lines of communication between the College and all our teacher-students who care to regard the Macdonald Institute and Ontario Agricultural College in any respect as an Alma Mater; in every way possible, to help, encourage and direct those who represent us in the schools in the newer lines of educational work."

Arrangements have been made to distribute reprints of these pages amongst inspectors and other teachers.

From the requests received from teachers to be placed on the mailing lists, it may be inferred that many have their interests awakened to the possibilities of giving instruction along vocational lines to children in the public schools. It is hoped that our bulletins may help to stimulate and direct the cause as well as to hold together in some degree all those who have been trained here.

THE PICTURE OF THE COLLEGE IN THE SCHOOLS.

Requests for copies of the picture of the College continue. This is sent free to the schools on condition that it be framed and given a place on the wall. With the picture a sheet of instructions is sent to the teachers, outlining a series of simple lessons that may be taken up with the children on agricultural matters through the medium of the picture. The picture is like the cut above, but having dimensions of 15″ x 20″. A good frame for it with glass will cost about a dollar. If the teacher wishes to have her pupils exercise themselves in *passe-partouting* the picture the cost will be very little. With pictures of the Farmers' College in every country school, the cause of agricultural education would grow unconsciously.



TEACHERS' READING COURSE.

This course is continued this year with some slight changes. Instead of teachers sending in answer papers through the winter, they will hereafter present synopses of their reading at the time of entering the second summer term. On these and the knowledge of the subject displayed, their credit will be judged.

The selection of books is made to supplement the instruction of the first summer term and also to better equip them for the work of the second summer term.

For satisfactory work during the two summer sessions and in the winter reading course, the certificate in Elementary Agriculture and Horticulture is awarded. The reading course is thus accepted as an equivalent of two weeks of a ten weeks' course, as it were.

The course for the school year 1909-10 is as follows:

September and October—Hodge's *Nature Study and Life.*

November—Plumb's *Types and Breeds of Farm Animals.*

December and January—King's *The Soil;* Dunn's *Weather* (Optional).

February—Dean's *Canadian Dairying.*

March—Robinson's *First Poultry Lessons.*

April, May and June—Bailey and Coleman's *First Book in Biology.*

EXTENSION WORK IN SCHOOL GARDENING.

During the year a Schools' Division of the Experimental Union was organized for the purpose of encouraging practical work in Elementary Agriculture and Horticulture in the schools.

The work was divided into two somewhat distinct sections. In one, known as the *Children's Gardening Section,* the Union offered to sell one cent seed packets to children for their own plots at home or in a school garden. In the other, known as the *Schools' Experiments Section,* teachers were offered seed free for four observation plots to be planted either in the school ground or in adjoining fields; these included a plot in Agriculture to show the seven different species of wheat, a plot in Forestry to show different maples, a plot in Horticulture to show the different kinds of onions, and a plot in Floriculture to show the different kinds of Nasturtiums.

For a commencement only the best teachers were wanted to co-operate and the names of these were secured through the Inspectors. In response to our offer applications were received from 116 schools for work in the *Children's Gardening* and from 22 schools for the *Schools' Experiments.* In all about 200 teachers took part in the work as several of the schools participating were graded schools.

More than 12,000 seed packets were sent out. As the distribution was limited to one packet of vegetable seed and one packet of flower seed to each child, this means that about six thousand school children received seed—a very good commencment for the work.

The reports on this work are very encouraging. There is no failure reported, although two teachers report *not successful.* With all the rest the verdict is *successful, very satisfactory, beneficial, quite successful, highly successful, encouragingly successful, very successful,* etc. Many interesting things are told about the pleasure the children had in it, the fine bouquets brought to school or sent to the sick, the successful fall fairs that were held, the splendid opportunities it afforded for good lessons in Nature Study, Art and Composition, the good effect of the work on the school discipline, the bringing of the school and home interests into closeness, the plans and ambitions for future work. One of the most interesting reports is that from an Indian School on the Cape Croker Reserve, Bruce County.

On the whole, it would seem that the scheme is commending itself to our teachers, and in many cases to the parents and trustees as well. It furnishes the teacher a ready means of making a commencement and brings with it, too, the encouragement that is aroused in working with others in a common cause and in similar ways. Nearly all the teachers who have sent in reports ask to be notified of next year's plans, and signify an intention of continuing the work. Several intend to try the work in plots in the school grounds, thinking that they can control it better and get better results through the competition that will naturally arise. In discussing its effects on the children, several note the improvement in the school spirit and discipline.

Plans are under consideration for continuing the work and offering additional help to the schools in the work.

A fuller report of the work will be made in the Annual Report of the Experimental Union.

VISITS OF SCHOOL CHILDREN TO THE COLLEGE.

There has been quite a marked growth in this phase of work to report for 1909. In June, 1908, about twenty children from three country schools in Brant County joined the Farmers' Institute excursion for a day's educational outing with their teachers. Last June thirty-four teachers brought children. From Brant County alone there were nine schools represented. In all there would be between three and four hundred children. In some cases two or three schools would unite in one party. The visiting schools comprised:

From Waterloo County (June 8): Mr. Corrigill, Elmira; Mr. Richmond, St. Jacobs; Mr. Boal, West Montrose; Miss Zuelsdorf, Winterbourne.

From Elgin County (June 10): Mr. Campbell, Iona.

From Haldimand County (June 11): Miss Ida Bird, Canfield; Miss Ola Culp, Fisherville; Miss Kindree, Clanbrassil; Miss Jean Mitchell, Hagersville; Mrs. Carver, Jarvis; Miss McFarlane, Cranston; Miss Thomson, Canfield; Miss Hedley, Gill; Mr. Johnson, De Cewsville; Mr. Neill, Cayuga; Miss Marjorie Burrows, Tyneside; Miss Bessie Thomson, York.

From Lincoln County (June 11): Mr. H. Gayman, Jordan Harbour; Mr. Newhouse, Homer; Miss Eberhardt, St. Catharines; Mr. Forman, Grimsby; Mr. Comfort, Beamsville.

From Halton County (June 16), 22 pupils: Miss Heeks, Trafalgar; Mr. Newell, Nassagaweya.

From Brant County (June 17), 100 pupils: Mr. A. E. Beaton, Scotland; Miss Ella Smith, Burford; Miss Messacer, Scotland; Miss Maud Castin, Vernon; Miss Webster, Miss King, Onondaga; Miss Robertson, Fairfield Plains; Mr. Wilkes, Scotland; Miss Raynor, Onondaga.

From Perth County (June 18): Mr. A. L. Hartmeir, Moncton.

Of course many other children visited us with their parents, and doubtless received benefit from the day's sightseeing. But where the visit is made in class and as a school exercise under their own teacher, a special value must pertain to it afterwards in the many uses that are made of the experience in class work. It may often be a good starting point for the teaching of agriculture.

We were fortunate in being able to provide capable guides and instructors for the visiting children and teachers. Students from our Normal Classes were deputed to the work. They were excused from their regular class work for the afternoon of the day that their home institute visited us. As they had become practically acquainted by this time with the different lines of work in the different College Departments, they were able to explain what was to be seen in laboratories, museums, stables, fields and orchard. For the teachers it was a good exercise in testing themselves as pedagogic guides in agriculture; they enjoyed the experience and received from the children's interests and questions new points of view for the teaching of the subject. As a rule they spent from half-past one to about half-past four with the class.

The movement is meeting with the encouragement and endorsation of school inspectors and further development may be looked for. The Inspector in North York issued the following notice to all his teachers:

Inspector's Office,

Aurora, June 10th, 1909.

To the Teacher
S. S. No...............
Dear....................................

I desire to call your attention to the invitation extended to you and your pupils by the North York Farmers' Institute to join in their excursion on June 15th to the Ontario Agricultural College, Guelph. I shall be glad to have you and your pupils accept this opportunity of visiting the College, the Macdonald Institute, and the Consolidated School. For particulars as to railway rates see large bills and posters.

Yours truly,

C. W. Mulloy,

P.S.I. North York.

In South Ontario the following notice was printed and sent out to trustees and teachers:

Whitby, June 5th, 1909.

To the Trustees and Teachers of the Public and Separate Schools in South Ontario:—

Last year some of the Counties of Ontario had their schools join the annual excursion of the Farmers' Institute to Guelph. These counties were so pleased with the innovation that they are repeating the experiment this year.

It is the earnest wish of the Directors of the South Ontario Farmers' Institute that the teachers and scholars of the schools in this riding be given an opportunity to visit the Ontario Agricultural College. An officer of the college is to be detailed to give his particular attention to the teachers and to bring to their notice the features of the college work which are of particular interest to them. Special provision will also be made for the children.

Dr. Waugh, Public School Inspector for South Ontario, is also desirous that so far as possible, both teachers and scholars be free to make the visit.

To this end we would ask that Wednesday, June 23rd, be declared a holiday in each school section of the riding.

(Signed)

J. H. Hare,
District Representative Ontario Department of Agriculture.

Elmer Lick,
Secretary-Treasurer, South Ontario Farmers' Institute.

For many teachers the invitation comes at an inopportune time, as the examinations for entrance to the High Schools are close at hand and time pressing for the preparation of candidates. There is good evidence, however, that it is a profitable holiday for teacher and pupils alike. Teachers write:

"Certainly I consider it was beneficial in every sense, in broadening their minds and training their powers of observation. They were especially interested in the museum and hothouses. There was much to be seen that was comprehensive to the pupils of each class. It did not interfere with my regular school work, for they learned more that day by actually seeing for themselves than any teacher could possibly teach."—*Halton Co.*

"I would like very much to repeat the outing, but am unable to say whether I shall or not. But it was such a success that I am sure other teachers around me shall take it in the future. It was a great pleasure to myself to be able to take the pupils on such a beneficial and enjoyable trip."

"The educational value of the outing I'm sure was alone worth the time spent. In so many ways we shall make use of that trip. I had pupils from my second, fourth and fifth classes. In geography the railroad stations and crossings, the general aspect of country, the elevations, the undulating ground with picturesque hills, etc., were all duly noted. Difference in trees and flora were observed as we were passing along and compared with our flora of the Niagara district.

"I scarcely know of a day when I derived so much pleasure. . . . Then some of my girls take care of the chickens at home; so I had to show them the chickens. It was a revelation to them, all those funny feeding utensils, and I have no doubt by their examination of troughs, etc., that next winter the manual training will produce some of these or similar ones.

"I believe a trip like we had every year planned earlier and having a larger representation from our Public Schools would arouse a great interest in the Nature Study phase of our education."—*Lincoln Co.*

"I may say that I have heard the opinions of many of the parents as well as that of the school children and they all agree in saying that they think the trip was beneficial and that the day was not lost. It did not interfere with my regular work in school, as knowing for some time that we were going, I arranged my work accordingly. I have made no use yet of our experiences, except by conversations, but hope to be able to try some 'garden plots' in the future."—*Haldimand Co.*

"Regarding the educational value of our outing to Guelph, I believe the new experiences gained by my children will not only be remembered by them, but will benefit them in many ways. They have new ideas of the train, distance of a city outside of St. Catharines, of school gardening, of Nature Study; and they saw many things that had time been given them they would like to have had explained to them. I think that if our children could take an outing such as we had at Guelph oftener, it would tend to closer observation, clearer thinking, and more independence in drawing conclusions. . . . My boys are very anxious to get some bees and watch them at work; they think they might also get a collection of insects. The week after their outing they made a small vegetable garden of 120 square feet, and are quite anxious for a garden such as they saw at Guelph.

"Speaking from a knowledge of the children's enjoyment of the day, I would say that an outing each year would be thoroughly appreciated.—*Lincoln Co.*

Respectfully submitted,

S. B. McCREADY.

PART XXI.

THE LECTURER IN APICULTURE.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit my first report in Apiculture.

First, as one of the increasing number in Ontario who are depending on this business for an income, let me thank you, sir, and the Department of Agriculture, for the interest shown in our industry by bringing the Ontario Beekeepers' Association under the direct supervision of the Department, by the increased grant for the inspection of apiaries, and by the appointment of a Provincial Apiarist for educational and experimental work.

As Provincial Apiarist, I was engaged during the summer in experimental work in an apiary established for the purpose at the Horticultural Experiment Station, Jordan Harbor. Six counties were also assigned me for inspection of apiaries. The educational work consisted of lectures given at the conventions of county beekeepers' associations, and at the Ontario Agricultural College.

At present the latter is confined to two lectures per week to the First Year Class during the Fall Term. Their attention had not been called to bee-keeping as a business. Many were prejudiced against it from a nervous dread of the irascible little insects it employs. Hence it was necessary to decide carefully what most valuable phase of the subject could be presented in a short lecture course.

The attention of the class was first called to the practical value of the subject in hand. Beekeeping is one of the most pleasant, healthful, and profitable of rural occupations. Pleasant because of the mysteries and problems of the teeming insect population of the hive, with their varied interests and ambitions; because duties connected with it are mostly out of doors in pleasant weather, and indoors when the weather is bad; because it is mostly clean, light work. It is healthful for the same reasons, and because the product is the purest and most wholesome of sweets. An apiary is profitable to the whole community by the increased fruit and seed production of the blossoms fertilized by the bees; and to the apiarist who, with the expenditure of some labor and experience, draws annual dividends of from 50 per cent to 75 per cent. on his cash investments.

It is unfortunate that a large percentage of beekeepers fail from lack of good management. This can be overcome only by education and training. Many a one owes success to early training received in the apiary of an experienced apiarist. Add to this training a scientific college course in the underlying principles of Apiculture and you have greatly increased possibilities for success.

After showing some of the advantages the attention of the class was called to some of the difficulties of practical apiculture. An imaginary visit was paid to an apiary in early spring, and the varied conditions of the colonies were used to illustrate the difficulty of wintering bees with uniform success. This showed the class that the wintering problem, for example, is a very real one. Then the changing seasons were brought into rapid review, and each shown to have its special difficulties in management. The most important ones were mentioned, and the remaining lectures were devoted to a discussion of these and of some of the established rules of management in each case.

Before the lectures could proceed it was found necessary for the class to gain a working vocabulary, with definitions of the more common terms, such as "colony," "apiary," "hive," "swarm," "queen," "worker," "drone," "larva," etc., also names of the parts of the hive and other things about the apiary.

To obtain any intelligent idea of the subject the underlying principles of bee nature must be mastered. Bees are not domesticated in the same sense as farm animals. They are simply wild insects induced to dwell near our homes by being provided with conditions most suited to their comfort and prosperity. It has been the purpose of the lecture course to describe these conditions, to give an outline of facts with which every beekeeper must be acquainted. Most of the students show a true interest in the subject and ask questions when given the opportunity. Some have asked for practical work and expressed a desire to specialize in the subject.

Owing to the lack of apiary and equipment no practical or research work could be attempted this year. It is expected, however, that the removal of this handicap will be commenced before another College year opens, as a nucleus of equipment is promised for the spring of 1910. The experimental apiary will be transferred from the Horticultural Experiment Station, Jordan Harbor, to the College Farm. A commercial apiary will also be kept at the Horticultural Experiment Station for the benefit of the fruit and for some experiments in the relation between bees and fruit.

I would strongly recommend that this subject be established regularly as a department of the College. There is no doubt that a full course in Apiculture would be increasingly popular. It will, of course, be necessary to have fully equipped apiaries for all kinds of experiments with bees and for the production of Comb Honey, Extracted Honey, and Queen Bees; also a laboratory for preparing honey in all kinds of experimental forms for market and for experiments in producing commercial beeswax, and for working out many other practical and scientific problems. When these are provided it will be possible to look to the graduating classes of the Ontario Agricultural College for valuable assistants and foremen of apiaries, trained inspectors of apiaries, queen-breeders, lecturers, experimentalists, and experts in all lines of apiculture.

Conventions.

In this work I attended conventions of county beekeepers' associations in Peel, Simcoe, Middlesex, Haldimand, Norfolk and Brant. This part of the educational work has great value in arousing local interest in beekeeping. Organizing leading men in the various counties also puts them in a position to secure better methods of production and better prices, and to present their needs more definitely before the Department of Agriculture. It will be wise for part of my time during the winter months to be spent in organizing some of the unorganized counties where beekeeping is extensively followed. I would also repeat a suggestion which I made in the "Canadian Bee Journal" some years ago, that there be a closer relationship between these associations and the Provincial Association. This might be accomplished by making the latter a sort of federation of the county associations.

Short Course in Apiculture.

To secure uniformity of action by the inspectors of apiaries, a special course of lectures would be of great advantage. While on their rounds they are expected to speak with authority on all subjects pertaining to the diseases of bees, the production of comb honey and extracted honey, the control of swarming, queen-rearing, re-queening, etc., etc. In a short course of lectures, under the direction of a competent instructor, many good ideas would be brought out by discussion of various methods of bee-management. I am sure a course of this kind would be especially appreciated also by young men and women who desire to keep bees but are not in a position to take the full college course.

STATUS OF BEEKEEPING.

Beekeeping in Ontario has made wonderful advances in the last few years. The time when it could not be mentioned without a smile and joke is happily almost past. The public is beginning to appreciate that it is a good business in which a few men have been making comfortable incomes for years. Men and women are looking to it for release from school-room and office. Bees are also receiving more friendly recognition from those who do not own them. Seed and fruit growers know them as their best friends in the fertilization of blossoms. Honey is a staple in the market with better and more uniform prices than have been known for some years.

These advances can be attributed to a great many agencies, such as the annual displays of honey at the Industrial Exhibition and the Horticultural Show in Toronto, and the newspaper reports of conventions. The beekeepers themselves are stimulated by these, and more especially by the visits of inspectors, whose coming arouses the careless or discouraged ones to the fact that their bees are a really valuable property and that there is hope of deliverance from the plague of foul brood. The opening up of the North-west Provinces has greatly increased the market for honey, and by no means the least stimulus is the work of the Crop Report Committee of the Ontario Beekeepers' Association.

The work of this committee is to send out forms to all beekeepers whose names are known, for a report of their honey crop. These are compared with last year's crop and prices and other things are taken into consideration, and all those who have reported their crop are advised as to the probable price of honey. The committee has shown remarkable foresight in naming prices for several years, and their reports are relied on by all leading producers and buyers in the province.

To enlarge the scope of this work I am compiling a card index of the names of all the beekeepers in the province, with the name of their post office, township and county. The cards are in duplicate, one set indexed according to the names of beekeepers, and the other according to counties and townships.

The information contained in such a set can be put to various uses, such as sending out bulletins and other free literature on beekeeping and allied subjects, assisting inspectors to find all the apiaries in their districts, etc. A record of the distribution of honey flora, on soil suitable for honey production, with special reference to territory not fully occupied by bees, would be of value to those desiring to locate apiaries. On the other hand, this department could be of great value to seed growers by supplying them with names of beekeepers who might be induced to establish apiaries close to their clover and buckwheat fields.

INSPECTION OF APIARIES.

The counties assigned me for inspection of apiaries were Wentworth, Brant, Halton, Haldimand, Lincoln, and Welland. During the limited time at my disposal for this work I was able to visit only the apiaries where disease was strongly suspected. These were carefully inspected, and where disease was found the proper treatment was applied, effecting a cure in every case where sufficient attention could be given. Through lack of time for this work some of the worst cases had to be left over till next season. Some of the other inspectors report the same condition in their districts.

THE FOUL BROOD SITUATION.

One of the greatest hindrances to our industry is this contagious disease which exists in many parts of the province. To try to check it a provincial inspector of apiaries was employed for a number of years, but the disease was found to be rapidly gaining ground. Many prosperous apiaries were destroyed, and the financial loss to their owners was great. Recently the number of inspectors has been increased, until last summer there were fourteen in the province. But with more than six thousand apiaries, the provision though much improved, is still quite inadequate. The only satisfactory way is to make a thorough inspection of every hive in the province within a limited time, say, not more than three seasons. This would locate all the disease, and with sufficient means and a competent staff of inspectors, it could be pretty well stamped out. As in the case of other diseases of live stock, the Dominion Department of Agriculture should assist in this.

Besides the actual inspection, valuable work is being done by our inspectors in distributing a small bulletin on Foul Brood, issued by the Ontario Department of Agriculture. It describes the symptoms and treatment in such a way that anyone who will take the trouble can cure his own and his neighbor's bees. The bulletin is as follows:

FOUL BROOD—ITS DETECTION AND CURE.

This dread disease of the honey-bee is due to a bacteria known to scientists as *Bacillus alvei*. The larva or brood of the bees in its early stages is attacked by the foul brood germs, decomposes, decays and settles in a shapeless mass to the bottom and lower side of the cell. It becomes yellowish-brown in color at first, but later brown or coffee color, and gives off a very offensive odor. If pricked by a pin or tooth-pick, it will be found ropy, and will draw or string out a half inch or so. If the cell has been capped, the capping recedes and presents a sunken appearance. In time the matter dries down, and is of such a sticky, gluey nature that it adheres strongly to the bottom of the cell, thus leaving what we call the scale or stain mark of foul brood.

In looking for the disease, hold the frame or comb so that the light may shine into it. The stain marks may be seen by standing with your back to the sun and holding so that the light will shine on and into the lower side of the cell.

Other forms of dead brood, such as chilled, starved, pickled and poisoned brood, are different in character, and may be described as follows: The larva dies, but holds its form better; that is, it shrinks or dries from the outside, gives off very little odor and less offensive, does not adhere so tightly to the cell side, and may be removed by a pin or tooth-pick, and when pricked by them will not string out, but appears watery. These diseases will be removed by the bees themselves.

Not so with foul brood, however, for soon after the death of the larva it becomes so foul that the bees will not attempt to clean it out. The cell is apparently avoided, until it becomes dried down, and the odor has become less noticeable. The bees then accept it again, and after polishing it fill it with nectar. The moisture thus applied softens the scale or stain mark and releases the thousands of foul brood germs which float in the honey or nectar—waiting only until fed to larva, thus coming in contact with congenial matter, and causing its death, and their further development and multiplication. Thus it spreads; more and more cells become polluted, the colony dwindles and dies, leaving its honey a prey to robbers, who unsuspectingly carry it to their homes, and thereby transmit the disease, until an apiary will be soon destroyed and neighboring apiaries jeopardized.

Watch your brood; take an interest in it. Whenever you lift out a frame have a look at the larva. If it is healthy, fat and white looking, all is well. If not, apply the tests and find out what is the matter. If you discover the real thing, close the hive and mark it for treatment.

METHOD OF TREATMENT.—To cure it we will follow the McEvoy method, getting rid of the combs and honey, for therein are the disease and germs. Go to the colony late in the evening, when the bees will not fly or scatter to other hives. Clip the queen and shake the bees off into the hive and give a set of frames with small foundation starters. We have thus got rid of the combs as far as this colony is concerned. Not so with the honey. As soon as we disturb the colony, the bees load themselves with the diseased honey, and we must still get rid of that. They also clean up any honey that shook out during the manipulation on the floor of the hive, and any that remains on bar combs or was attached to the inside of the hives. This the bees would store if they had a particle of comb supplied ready. We have only given foundation starters, however, and they must work it out; wax secretion is necessary. Most of the honey is digested and used; but they soon have cells built and may store some of the diseased honey therein. To make a complete cure it is therefore necessary to again shake three days later, the same way as before, and supply full sheets of foundation.

Melt or burn up the old combs and the first set of starters, and the cure is complete if thoroughly carried out.

This cure can only be applied in the early part of the season and during a honey flow. If no flow is on the bees must be fed or they will swarm out and perhaps scatter into one or more hives, and thus make matters worse.

If the disease is discovered late in the season, and the colony is still strong, leave it until November, take the diseased combs away, and supply honey from a clean colony, in full sealed combs. *Be sure that the colony from which you take these sealed combs is itself free from disease.*

Saving of Brood.—Brood from badly diseased colonies is of no value and dangerous and should be melted, burned or otherwise destroyed at once. Brood from colonies having only a few cells diseased might be placed over an average colony only slightly diseased and the queen caged. When most of the brood has hatched, treat as given above.

Saving of Combs.—Combs free from pollen, that have never been used for brood rearing, that are white and clean, and have been dried from all honey before the colony was treated are reasonably safe for use as super combs. *As a rule, however, it would pay better to melt them into wax and use full sheets of foundation. All doubtful combs should be melted down.*

Empty hives, also, in which the bees have died or diseased combs have been stored or carried should be scalded or the inside burned over with a gasoline or oil torch.

AN ACT FOR THE SUPPRESSION OF FOUL BROOD AMONG BEES.

6 Edward VII., 1906.

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. This Act may be known as "The Foul Brood Act."

2. The Lieutenant-Governor in Council upon the recommendation of the Minister of Agriculture may from time to time appoint one or more inspectors of Apiaries to enforce this Act, and the Inspector shall, if so required, produce the certificate of his appointment on entering upon any premises in the discharge of his duties. And the Minister shall instruct and control each Inspector in the carrying out of the provisions of this Act. The remuneration to be paid to any Inspector under this Act shall be determined by order of the Lieutenant-Governor in Council.

3. The Inspector shall, whenever so directed by the Minister of Agriculture, visit without unnecessary delay any locality in the Province of Ontario, and there examine any apiary or apiaries to which the said Minister may direct him, and ascertain whether or not the disease known as "foul brood" exists in such apiary or apiaries, and wherever the said Inspector is satisfied of the existence of foul brood in its virulent or malignant type, it shall be the duty of the Inspector to order all colonies so affected, together with the hives occupied by them, and the contents of such hives, and all tainted appurtenances that cannot be disinfected, to be immediately destroyed by fire under the personal direction and superintendence of the said inspector; but where the inspector, who shall be the sole judge thereof, is satisfied that the disease exists, but only in milder types and in its incipient stages, and is being or may be treated successfully, and the Inspector has reason to believe that it may be entirely cured, then the Inspector may, in his discretion, omit to destroy or order the destruction of the colonies and hives in which the disease exists. 53 V., c. 66, s. 3.

4. The Inspector shall have full power, in his discretion, to order any owner or possessor of bees dwelling in box-hives, in apiaries where the disease exists (being mere boxes without frames), to transfer such bees to movable frame hives within a specified time, and in default of such transfer, the Inspector may destroy, or order the destruction of, such box hives and the bees dwelling therein. 53 V., c. 66, s. 4.

5. Any owner or possessor of diseased colonies of bees, or of any infected appliances for bee-keeping, who knowingly sells or barters or gives away such diseased colonies or infected appliances, shall on conviction thereof, before any Justice of the Peace, be liable to a fine of not less than $50 or more than $100, or to imprisonment for any term not exceeding two months. 53 V., c. 66, s. 5.

6. Any person whose bees have been destroyed or treated for foul brood, who sells or offers for sale any bees, hives or appurtenances of any kind, after such destruction or treatment, and before being authorized by the Inspector so to do, or who exposes in his bee-yard, or elsewhere, any infected comb, honey, or other infected thing, or conceals the fact that said disease exists among his bees, shall, on conviction before a Justice of the Peace, be liable to a fine of not less than $20 and not more than $50, or to imprisonment for a term not exceeding two months, and not less than one month. 53 V., c. 66, s. 6.

7. Any owner or possessor of bees who refuses to allow the Inspector to freely examine said bees, or the premises in which they are kept, or who refuses to destroy the infected bees and appurtenances, or to permit them to be destroyed when so directed by the Inspector, may, on the complaint of the Inspector, be summoned before a Justice of the Peace, and, on conviction, shall be liable to a fine of not less than $25 and not more than $50 for the first offence, and not less than $50 and not more than $100 for the second and any subsequent offence, and the said Justice of the Peace shall make an order directing the said owner and possessor forthwith to carry out the directions of the Inspector. 53 V., c. 66, s. 7.

8. Where an owner or possessor of bees disobeys the directions of the said Inspector, or offers resistance to, or obstructs the said Inspector, a Justice of the Peace may, upon the complaint of the said Inspector, cause a sufficient number of special constables to be sworn in, and such special constables shall, under the directions of the Inspector, proceed to the premises of such owner or possessor and assist the Inspector to seize all the diseased colonies and infected appurtenances and burn them forthwith, and if necessary the said Inspector or constables may arrest the said owner or possessor and bring him before a Justice of the Peace to be dealt with according to the provisions of the preceding section of this Act. 53 V., c. 66, s. 8.

9. Before proceeding against any person before a Justice of the Peace the said Inspector shall read over to such person the provisions of this Act or shall cause a copy thereof to be delivered to such person. 53 V., c. 66, s. 9.

10. Every bee-keeper or other person who is aware of the existence of foul brood, either in his own apiary or elsewhere, shall immediately notify the Minister of the existence of such disease, and in default of so doing shall on summary conviction before a Justice of the Peace be liable to a fine of $5 and costs. 53 V. c. 66, s. 10.

11. Each Inspector shall report to the Minister as to the inspection of any apiary in such form and manner as the Minister may direct, and all reports shall be filed in the Department of Agriculture, and shall be made public as the Minister may direct or upon order of the Legislative Assembly.

12. Chapter 283 of the Revised Statutes of Ontario, 1897, intituled "An Act for the Suppression of Foul Brood among Bees," is repealed.

Note.—Any bee-keeper suspecting that foul brood exists in his own or neighboring apiaries should at once notify the Director, Fruit Branch, Department of Agriculture, Toronto.

EUROPEAN FOUL BROOD.

Until the last two seasons the only species of Foul Brood known to exist in Ontario was that described in the last paragraph. But another kind of brood disease has made its appearance, and to distinguish the two, the new variety is named "European Foul Brood," and the more common kind is called "American Foul Brood."

European Foul Brood has destroyed the apiaries in great areas of different states in the Republic to the south of us. It is now known to be rampant in at least one section of Ontario. In one way it is much more to be dreaded than the American Foul Brood, because it runs its course and destroys an apiary much more rapidly, and because the adult bees will carry out the disease scales and scatter them in the yard and farther, to find their way into healthy colonies.

The symptoms are easily distinguished from American Foul Brood, as there is no ropiness, and the odor is different. Most of the larvæ die before they are sealed, and do not lose their form, but remain coiled in their natural position. The color in the earlier stages is lighter than in American Foul Brood. The odor is very pronounced and offensive, like decayed fish.

The McEvoy treatment is effectual if applied to the whole apiary at once, even though only a few colonies show the symptoms. Even then the cure is only permanent when the apiary is thoroughly Italianized.

PICKLED BROOD.

A disease slightly resembling Foul Brood has been designated as "Pickled Brood." The most positive difference in the diagnosis of this disease is the absence of ropiness and of the "glue pot" smell, which are always found in American Foul Brood. In Pickled Brood the larva decays from the inside leaving the skin tough and in its natural shape, in Foul Brood the skin of the larva softens as the contents become glutinous and all the natural wrinkles become smooth as the mass settles to the lower side of the cell. In Pickled Brood the larva often dries up so as to become loose in the cell and fall out when the comb is inverted. In American Foul Brood it always cements fast to lower cell wall so it cannot be removed without tearing the cell.

McEvoy asserts that Pickled Brood is caused by an insufficient feeding of the larvae, due to a sudden check of the honey flow, or a constitutional weakness of the workers. The latter he charges to in-breeding of the queens. Requeening with vigorous queens from other apiaries will often effect a cure, and it often disappears of its own accord.

THE LIBRARY.

The nucleus has been formed of a Library of Bee Literature, which will have all the standard works on the subject. These are in process of collection and the leading articles are being indexed. It is proposed to continue the work of collecting and indexing until the Provincial Library of Apiculture is made most complete.

Such a library at the seat of Agricultural learning will be of inestimable value to the bee-keepers of the province.

A MODEL APIARY.

Another feature of great educational value to the province at large would be a model apiary in which the bees, hives, buildings, machinery and all appliances are of the greatest practical value. Students, and especially the visitors of the June excursions, would be able to study every detail of the equipment and go home to renovate the wasteful methods which now exist in so many farm apiaries.

EXPERIMENTAL WORK.

This work which was conducted at the Horticultural Experiment Station, Jordan Harbor, was of necessity on a very small scale, as the bees and appliances had all to be bought and moved there, and the apiary building had to be erected. My time was also taken up with inspection and other work, so as to leave only two days per week with the experimental apiary. If this work is to be of any value it will be necessary to give it most of my time during the summer months.

A start was made, however, by finding out what had already been done at other Experiment Stations, so as to avoid needlessly going over ground which had been fully covered. For this purpose a circular letter was sent to all the Experiment Stations in Canada and the United States. Most of these report that they are doing nothing with bees. A few had done some work in past years, but had dropped it through pressure of other things. The only work of value that was reported to me as being done at the present time is in Tennessee, Maryland and Texas, and at United States Department of Agriculture, Washington, D.C. Dr. E. F. Phillips, Ph.D., in charge of that work, kindly sent me some valuable suggestions for experimental work.

I might say in a general way that experiments in the following lines were begun:

(*a*) To determine the influence of weather conditions on the working of bees and the nectar secretion of blossoms.

(*b*) To determine the amount of wax from foundation which is worked out by bees into the cell walls of the combs.

(*c*) To contrive some practical way of separating the wax and honey contained in cappings which have been removed from combs in the process of extracting honey.

(*d*) To test new inventions and report on their practical value for the benefit of bee-keepers.

(*e*) To test queens sold by commercial queen breeders.

PROBLEMS TO BE WORKED OUT.

The greatest problem which confronts the practical bee-keeper is that of controlling absolutely the mating of queen bees. This has so far baffled all scientists who have worked on it. Even Mendel, who did so much for the breeders by discovering the law of heredity, failed when he attempted this. Until it is solved very little progress can be made in developing and fixing desirable qualities in any strain of bees. I hope to take up this work. Other problems are, Wintering, Spring Management, and Swarm Control.

The experimental work must be, first of all, practical. As all practical work must be based on sound scientific principles, the underlying principles in the problems of bee-keeping must be established, and in order to do this a great deal of investigation must be carried on which does not immediately lead to practical results. Until we have our own laboratories, the bacteriological and chemical laboratories of the College will be of great value.

CO-OPERATIVE EXPERIMENTS.

Many of the experiments will yield more valuable results if conducted simultaneously in different parts of the province. To this end I would solicit the cooperation of the Experimental Union, many of whose members are doubtless engaged in bee-keeping.

DEVELOPING NEW TERRITORY.

It is pretty well established that bees can be kept wherever man can live and cultivate the soil. At present there are vast areas of new territory in New Ontario and the Western Provinces where honey-bearing flora is abundant, but no bees are kept. Some farmers in these places are anxious to keep bees because they see that honey is going to waste when they might be getting the good of it. Different students at the College have spoken to me about it. I think the establishment of experimental apiaries in New Ontario would be a valuable line of work to take up.

In fact there is so much educational and experimental work that can be done that it is simply a matter of choosing the work nearest at hand and reaching out for more as rapidly as possible.

MORLEY PETTIT.

PART XXII.

THE DEAN OF RESIDENCE.

To the President of the Agricultural College:

Sir,—I have the honor to submit my first report as Dean of Residence and Instructor in English, for the year 1909.

My duties commenced on July 1st and were at first limited to conducting repairs in and about the Residence, entertaining visitors, preparing lectures and generally making ready for the commencement of the term on Sept. 14th.

Affairs in the residence have preserved an entirely satisfactory character. The health of the students has been good, with the exception of a few trivial cases of cold, grippe, etc. A feature to which I should like to draw your attention is the keenness and enthusiasm shown in maintaining an amateur fire brigade. There are at present sixteen double hydrants in the grounds, in such positions as to render it possible to direct two streams of water upon any building within the College precincts. The students who form this volunteer fire brigade show great promptness and activity in their work, and from time to time I receive a report from the captains of reels, of which there are three, upon practice work. It is my opinion that everything should be done to encourage work of this sort, which is important both from the viewpoint of common safety and also from that of practical training. If I might suggest it, the installation of a system of communication between all buildings and the engine-room is not only desirable but necessary.

At present there are 215 students in residence and the accommodation is taxed to its fullest extent. The residence has been completely filled since the beginning of the term.

My work in English Composition, with the First Year, consists of lectures on the general principles of writing and rhetoric and the broader technique of the essay. Subjects are assigned for composition, and the productions of the students are corrected, noted, marked and handed back. With comparatively few lectures and with a class of such varied attainments, a detailed course of grammatical instruction is not possible. My object is to give the students only such broad and general rules as can be applied directly to their own necessary writing, the taking of notes, condensing of chapters, etc. The English Literature Class (Third Year) has been a remarkably good one. Since the commencement of the term we have read the "Twelfth Night," of Shakespeare, and studied the play critically, taken up the dramatic development of Shakespeare, and also had time for a series of lectures on "The Origin of the Drama in England, and its Development up to the Elizabethan Period." This class has been one of the most attractive phases of my work.

In conclusion I can gratefully assert that I have had the help and support of all connected with the residence, a fact I most heartily appreciate.

Yours respectfully,

G. H. UNWIN.

PART XXIII.

THE LIBRARIAN.

To the President of the Ontario Agricultural College:

Sir,—I have the honour to submit herewith the report of the Library for the year 1909.

During the past year 1,104 volumes have been added to the Library and these are classified as follows:

Agricultural reports	94
Agriculture	69
Bacteriology	36
Bees	2
Biography	37
Botany	30
Chemistry	101
Dairy	7
Description and travel	16
Domestic animals	46
Domestic science	44
Drawing and decoration	21
Economics	53
Education	34
Engineering and electricity	6
Entomology	13
Ethics and religion	49
Fiction	37
Fine arts	15
Forestry	30
Geology	4
History	13
Horticultural reports	19
Horticulture	31
Hygiene	39
Literature	129
Manual training	8
Nature study	7
Ornithology	3
Physics	6
Poultry	6
Psychology	4
Reference books and general magazines	33
Science	29
Science reports	22
Useful arts	1
Zoology	4
General reports	6
	1,104

The following sets of books have been added to the Reference Shelves:

Dictionary of National Biography	22	vol.
Analyst (a chemical periodical)	32	"
Standard Library of Natural History	5	"
Seton, Ernest Thompson, Life Histories of Northern Animals	2	"
Green, Richard, Short Story of the English People, illus. ed.	4	"

We wish to take this opportunity of expressing our appreciation of all our exchanges, especially of those of the United States Department of Agriculture and of the Experiment Stations of America, Australia, Cape Colony, England, Europe, India, Japan and South America.

Two new exchanges have been sent to us, for which we are very grateful: Bee-keepers' Review, Flint, Michigan; Practical Dairyman, Rutherford, N.J.

One of the visitors with the National Women's Congress in June, Miss A. M. Machar, has also kindly sent us a copy of her novel, "Roland Graeme, Knight."

The binding of periodicals has amounted to the same as last year's, 170 volumes having been done. Of the loose and worn books, 91 volumes have been rebound, besides those which needed mending only.

The circulation of books for home use has been 5,325 volumes during the year. From April 19th to June 30th, while the Normal Class was at the College the circulation amounted to 858 volumes. Of these 336 volumes were to regular students of the College and Macdonald Institute, leaving 522 volumes taken by the Normal students. The fiction amounted to 363 volumes out of this number. and science and agricultural books to but 159. This does not include, however, the Manual Training books kept in that department, or the Agricultural and Nature Study books in the Nature Study Office, which could be read there.

During the past year 1,284 books have been recatalogued, covering the classes of bacteriology, physiology, literature and fiction. This brings the number of volumes classified and catalogued, according to subject, to about 7,400 volumes. The number of volumes in the Library is 19,410.

I have the honor to be, Sir,

Your obedient servant,

EDITH C. DWIGHT.

PART XXIV.

THE PHYSICIAN.

To the President of the Ontario Agricultural College:

Sir,—As requested in your letter of recent date, I present to you my report for the current year.

I shall not give the details of the many minor ailments and injuries occurring in Macdonald Hall and in the College during the winter months. They were such as we usually have in these institutions and in this community. You will recollect, however, that one of the students of the First Year was seriously ill from empyema just at the close of his term, and that he entered St. Joseph's Hospital, where he was obliged to undergo an operation and to remain for several weeks before he was sufficiently recovered to return to his home. I am glad to state that my latest news from him is quite encouraging, though his further studies in the College have been indefinitely postponed. I have also to report a case of typhoid fever in one of the young ladies in Macdonald Hall just after the Easter vacation. She entered the General Hospital, where, after an illness of several weeks, she made a good recovery. It will be a satisfaction to you to know that infection was not received during her residence in the Hall.

In September of this year the College and Institute opened with the largest attendance on record, and thus far the health of the students in both places has been very satisfactory. Football injuries have been, however, rather more numerous than usual. Fracture in the forearm occurred in one game, fracture of the clavicle in another, and a serious injury to the elbow joint in a third, besides several injuries of less gravity.

I am glad to hear of the prospect of increased residential accommodation, which I am sure will add to the comfort of the many students seeking admission.

Respectfully submitted,

W. O. STEWART.

INDEX.

Acid Soils, 85.
Ageing Wheat and Flour, influence of, 74.
Agricultural Specialties in County Towns, 16.
Alfalfa, 44, 46, 66, 228.
Alkaline Soils, 85.
Alsike Seed, 46.
Animal Husbandry (Report), 133.
Anthrax, 126.
Apiaries, inspection of, 285.
Apiculture (Report), 283.
Apple Scab, 34.
Apple Tree Blight, 128.
Arsenates, 80.
Ashes, Wood, 92.
Associate Diplomas, 11.

Bachelors Science of Agriculture, 10.
Bacterial Blight of Apple and Pear Trees, 128.
Bacteriology (Report), 125.
Baking Tests, 71.
Barley, 190.
Barnaby's Thistle, 38, 39.
Beans, 205, 206.
Beekeeping, status of, 285.
Bethune, Charles J. S. (Report), 25.
Bindweed, 43.
Black Rot Canker, 35, 41.
Blending of Wheats, 76.
Bordeaux Paste, 81.
Botany (Report), 37.
Bread, 67, 69.
Buckwheat, 203.
Buffalo Bur, 40.
Bur Grass, 38.
Butter, Hand *vs.* Machine Printing, 106.
Buttermilk, Loss of Fat in, 104.
Buttermilk for Feeding Swine, 144.
Butter Paper, 126.

Caesar, Lawson, Experiments with Insects, 30.
Carrot Rust-Fly, 29.
Casein and Fat in Milk, 107-116.
Cattle Feeds, 61.
Cheese, 81, 114, 117, 121.
Chemicals, influence on Wheat and Flour, 76.
Chemistry (Report), 60.
Chrysanthemums, 154.
Clover Seed Investigation, 44, 46, 47.
Cockroaches, or Croton Bugs, 30.
Codling Moth, 31.
College Roll, analysis, 10.
Co-operative Experiments with Farm Crops, 173.
Co-operative Planting of Trees, 244.
Corn, 208, 209, 220.
Corn-ear Worm, 29.
Corn Silage, 65.
Country Schools, visits to, 273.
Cow Testing, official, 100.
Cream Pasteurization, 101, 102, 103, 104, 105.
Cream Testing, 100.
Creamery, O.A.C., 96.
Creamery Experiments, 97.
Creelman, G. C. (Report), 7.
Crow, J. W. (Report), 146.
Curd Knives, Fine *vs.* Coarse, 122.
Curd, Stirring *vs.* Not Stirring, 117.

Dairy Experiments, 81, 135.
Dairy Herd, 134.
Dairy Husbandry (Report), 96.
Dairy School Certificates, 13.
Day, G. E. (Report), 133.
Day, W. H. (Report), 49.
Dean, H. H. (Report), 96.
Dean of Residence (Report), 292.
Drainage, 55.
Dwight, Edith C. (Report), 294.

Economics (Report), 231.
Edwards, S. F. (Report), 125.
Emmer, 208.
English (Report), 23, 232, 266, 292.
Entomology (Report), 25.
European Foul Brood, 288.
Evans, John (Report), 238.
Excursions, 15.
Experimental Plots, 163.
Experimental Union, 15.

Farm Crops in Ontario, 169.
Farm Superintendent (Report), 133.
Fat and Casein in Milk, 107-116.
Feeds, Cattle, 61.
Fertilizers, 85.
Field Experiments (Report), 163.
Field Husbandry (Report), 163.
Financial Statement, 17.
First-class Men, 11.
Flax, 182, 206.
Floriculture, 153.
Flour, 68, 69, 70, 199.
Fodder, 220, 223, 224, 225, 228.
Foods, Human, 66.
Forked Catchfly, 38.
Forestry (Report), 243.
Foul Brood, 286, 287.
Fungicides, 76.

Gamble, W. P. (Report), 84.
Gardens, School and Home, 152.
Geology, relation to Agriculture, 93.
Geology (Report), 84.
Geraniums, new, 155.
German Knot-grass, 40.
Gladioli, 155.
Graduates, 10.
Grain Mixtures, 185, 186, 187, 188, 190.
Graham, W. R. (Report), 157.
Gum Disease of Peach Trees, 36.
Gum Weed, or Gum Plant, 38.

Hairy Vetches, 207.
Harcourt, R. (Report), 146.
Hedgehog Grass, 38.
Home Economics, 8.
Home Economics (Report), 232.
Horticulture (Report), 146.
Human Foods, 66.
Hutt, H. L. (Report), 150.

Improvement of Farm Crops, 176.
Industrial Arts Course, Elementary, 239.
Insecticides, 76.
Insects, injurious, 27.
Irrigation, 148.

Jarvis, T. D. (Report), 29.
Jones, D. H. (Report), 128.

Kohl Rabi, 219.

Landscape Gardening (Report), 150.
Lead Arsenate, 80.
Leaf Blister Mite, 31.
LeDrew, H. H. (Report), 231.
Legume Bacteria, 131.
Leguminous Crops for Fodder, 228.
Librarian (Report), 293.
Lightning, damage by, 54.
Lime-Sulphur Wash, 77.

McCready, S. B. (Reports), 37, 246.
McMeans, A. (Report), 147.
Macaroni, 200.
Macdonald Institute Certificates, 13.
Mangels, 215, 216.
Manual Training (Report), 238.
Mechanics (Report), 238.
Medals, 12.
Milk, 99, 100, 107.
Mill By-products, composition of, 62.
Millet, 207, 225, 226.
Mixed Grains, 185, 186, 187, 188, 190.
Molac Dairy Food, 139, 141.
Museum, 36.

Nature Study, 25, 246, 250, 271.
Nature Study (Report), 246.
Nurseries, 244.

Oats, 184, 193.
Onions, keeping test, 148.
Orchard Surveys, 147.
Oyster-shell Scale, 33.

Paris Green, 80.
Parsnips, 219.
Pasteurization in Buttermaking, 101-105.
Pasture Crops, annual, 230.
Pear Scab, 35.
Pear Tree Blight, 128.
Peas, 204.
Pettit, Morley (Report), 283.
Physician (Report), 294.
Physics (Report), 49.
Pickled Brood, 289.
Picture of College in Schools, 278.
Plant Diseases, 40, 128.
Potato Beetle, control of, 30, 211.
Potato Blight, 212.
Potatoes, 210, 212.
Poultry, feeding, 159.
Poultry, hatching and rearing, 158, 159, 161.
Poultry Houses, 157, 158.
Poultry Husbandry (Report), 157.
President (Report), 7.
Prizes, 12.
Public Speaking, 23, 232.

Reclamation of Non-Agricultural Lands, 245.
Red Clover Germination Tests, 46, 47.
Reed, J. H. (Report), 95.
Reynolds, J. B. (Report), 23.
Road Materials, 92.
Rocket, or Roquette, 38, 39.
Root Crops in Ontario, 214, 215.
Ropy Milk, 126.
Roses, hardy outdoor, 156.
Rye, 202, 203.

Sandbur, 38.
Scholarships, 12.
School Children, visits to College, 280.
School Grounds and Gardens, 152.
Seed Selection, 177.
Short Courses, 9.
Skim-milk for Feeding Swine, 144.
Smut, treatment of Grain for, 180.
Sodium Arsenate, 80.
Soil Chemistry (Report), 84.
Soil Investigation, 84, 85.
Sorghum, 208, 223.
Sow Thistle, 38.
Soy Beans, 206.
Spraying, 31, 42.
Springer, S. (Report), 17.
Staff Changes, 7, 237.
Stewart, W. O. (Report), 294.
Stock Judging, 14.
Stooling of Cereals, 183.
Stratton, R. W. (Report), 97.
Straw, strength of Oat, 196.
Students of the year, 9.
Sugar Beets, 217.
Sugar Beet Meal, 140.
Summer School for Teachers, 241, 271.
Sunflowers, 208, 224.
Swine, feeding experiments, 141.

Tar Paper, experiment, 43.
Teachers' Certificates in Agriculture, 270.
Teachers' Conventions, 276.
Teacher Training in Nature Study, 246, 267, 274, 279.
Tillson's Dairy Food, 141.
Timothy Seed, 47.
Traction Ditcher, 59.
Trustee Associations, 276.
Turnips, 218.

Underdraining as an Investment, 56, 57.
Unwin, G. H. (Report), 292.

Vegetable Gardening, 147.
Veterinary Science (Report), 94.

Water for Domestic Purposes, 88, 89, 90.
Watson, M. U. (Report), 237.
Weather, 49, 168.
Weed Seed Collection, 40.
Wheat, 66, 67, 69, 70, 196, 197, 199, 200, 201.
Whey Butter, 83, 123.
Whey, feeding to swine, 142, 143, 144.
White Arsenic, 80.
Women's Institutes, 15, 235.
Wood Ashes, 92.
Woodlots, College, 243.

Zavitz, C. A. (Report), 163.
Zavitz, E. J. (Report), 243.
Zoology (Report), 25.

Thirty-First Annual Report

OF THE

Ontario Agricultural and Experimental Union

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

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1910

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TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Agricultural and Experimental Union for 1909.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

CONTENTS.

PAGE.
Union Members 5
Officers for 1909-10 8
Treasurer's Report: H. L. Hutt 8
Secretary's Report: C. A. Zavitz 9
President's Address: J. O. Laird 10
Results of Co-operative Experiments in Agriculture: C. A. Zavitz 13
Results of Co-operative Experiments with Fertilizers on Muck Soils: W. P. Gamble. 39
Report on Co-operative Forestry: E. J. Zavitz 43
Report of Co-operative Experiments in the Growing of Onion Seed in Ontario: A. McMeans 44
Report of School Children's Home Garden Plots and of Experimental School Plots in Elementary Agriculture, Forestry and Horticulture: S. B. McCready ... 46
An Act Respecting Commercial Feeding Stuffs: R. Harcourt 49
Importation and Distribution of Noxious Weed Seeds in Screenings 55
Teaching Agriculture in High Schools: A. McKenney 57
What the Farmers' Clubs are Doing: F. C. Hart 59
The Need of Local Demonstration Plots in Ontario: H. Sirrett 62
Value of Experimental Work in Lanark County: R. S. Hamer 63
A Series of Short Judging Courses: I. F. Metcalf 64
Influence of a Five Days' Judging Course: D. McKenzie 66
The Encouragemnt of Underdraining: J. H. Hare 68
Growing Corn for the Canning Factory: A. P. McVannel 70
How I Have Started Work in Peterboro' County: H. C. Duff 72
Half a Year in Norfolk County: P. E. Angle 73
The Possibilities of Agriculture in Dundas: A. D. Campbell 77
The Improvement of Country Roads in Ontario—Suitable Material, Method of Construction, Proper Maintenance, etc.: A. W. Campbell 79
The Ex-Students of the O.A.C.: G. S. Henry 83
Address: Hon. J. S. Duff 85
Address: Hon. Frank Cochrane 87
Address: Hon. Nelson Monteith 91
Svalof: C. C. James 91
Resolution 112

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TREASURER'S REPORT, 1909.

Receipts.

Balance from last year	$ 218 68
Membership fees, 388 at 50c.	194 00
Government grant	2,750 00
Total	$3,162 68

Expenditures.

Agricultural experiments	$ 1,766 11
School garden experiments	428 54
Chemical experiments	54 33
Vegetable experiments	4 20
Reporting Annual Meeting, 1908	43 00
Expenses Annual Meeting, 1909	120 50
Interest on money borrowed	2 25
	$ 2,418 93
Balance on hand	743 75
	$ 3,162 68

We, the undersigned auditors, declare that we have examined the Treasurer's accounts and found them correct.

W. J. Squirrell,

J. B. Fairbairn,

Auditors.

December 4th, 1909.

Agricultural and Experimental Union

ANNUAL MEETING.

The thirty-first annual meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College, Guelph, on Monday, Tuesday and Wednesday, December 6th, 7th and 8th, 1909.

The President of the Union, Mr. J. O. Laird, Blenheim, presided over the regular sessions, and Mr. G. C. Creelman, President of the College, at the annual supper on Tuesday evening.

SECRETARY'S REPORT.

By C. A. Zavitz, Professor of Field Husbandry, Guelph.

The co-operative work of the Experimental Union has been enlarged and improved during the past year. It is now twenty-four years, or almost a quarter of a century since the present system of co-operative experimental work was started in a small way by the Experimental Union. From the beginning it has gradually increased in extent and in influence throughout the Province. We have now hundreds of men throughout Ontario who have successfully conducted experiments on their own farms for five or more, and even up to ten, twelve, or fourteen years. In 1909, the co-operative work was conducted on farms throughout Ontario in Agriculture, Horticulture, Forestry and Poultry-raising, and in connection with the Public schools in elementary Agriculture, Horticulture, and Forestry. Although a limited amount of work in connection with the schools had been conducted in previous years, it was not until 1909 that this branch of the work was placed under a separate committee. We are pleased to state that the work in connection with the schools has been largely increased this year and we believe that there are excellent opportunities for great development along this line.

The co-operative work in Agriculture has been conducted for a longer time than that of any other department. The number of co-operative experiments for the twenty-four years from 1886 to 1909 is 54,345. In Agriculture alone definite experimental work was conducted on measured plots on no less than 4,853 farms in 1909. There are now no less than 38 separate experiments which cover all the most important farm crops in the Province of Ontario, and which deal with varieties of crops, mixtures of grains and grasses, application of commercial fertilizers, and different methods of cultivating the soil.

In Horticulture, the total number of co-operative experiments for the sixteen years from 1894 to 1909, inclusive, is 9,571. In 1909, owing to a re-arrangement in the Horticultural department of the College, the co-operative work of the Experimental Union was entirely dropped for the present excepting the growing of onion seed and the work in connection with the schools of the Province.

In the department of Agricultural Chemistry, co-operative work has been carried on in the study of muck soils by the use of commercial fertilizers.

The departments of Forestry and of Poultry-raising have again been conducting work during the past year. As the work undertaken by the Poultry Department, however, requires a number of years for its development, the results are as yet incomplete.

It is impossible to estimate the influence of the co-operative experiments in Ontario in bringing twenty-five to thirty thousand farmers to visit the College annually, in over-flowing the College with students, in doubling the output of Ontario farms during the past sixteen years, and in the betterment of both the farmers and the farms of Ontario.

The experimenters deserve great credit and the hearty thanks of the farmers of Ontario for the excellent work which they are doing, not only for themselves and the neighboring farmers but also for the improvement of the agriculture of the country. As many of the experimenters combine the practical experience obtained on the farm, the educational training secured at the Agricultural College, as well as the special training furnished by successfully conducting co-operative work on their own farms for several years in succession, the reports are becoming more valuable from year to year. It is certainly correct to say that the Experimental Union has an excellent corps of experimenters. While it is true that these men have done most excellent work in the past, we believe that even greater success awaits the Experimental Union in the future.

The Board of Control of the Experimental Union has held three meetings during the past year, two in December, 1908, and one in September, 1909.

About 30,000 copies of the Annual Report of the Experimental Union for 1908 were printed and distributed by the Ontario Department of Agriculture in the early part of the present year. We are also greatly pleased with the publication of the results of the Union through the Agricultural journals and the leading newspapers of the Province. It will therefore be seen that a very large number of the farmers of Ontario had an opportunity of reading and studying the results of experiments conducted throughout Ontario in 1908.

Many of the States of the American Union and some of the countries in Europe have started co-operative experimental work somewhat similar to that which was commenced in Ontario almost a quarter of a century ago. May the work of the past encourage us to better and greater things in the future and to thus make our work more perfect and more worthy of imitation.

PRESIDENT'S ADDRESS.

By J. O. Laird, Blenheim.

Another year has passed beyond our recall, and again we have come together to hear and discuss the results of the work of the Ontario Agricultural and Experimental Union, and try to learn something that will be of value to us as agriculturists in the years that are still before us.

On behalf of myself and the other members of the Union executive, I extend to the visitors, officers, ex-students, and students of the College a most hearty welcome to this, the thirty-first annual meeting of the Experimental Union, and I hope that everyone will feel free to ask any questions that may occur to him as the meeting proceeds, and that we will not only have addresses on the various subjects upon the programme, which will be instructive, but that the discussions upon these subjects will teach us much, and broaden our ideas along agricultural lines.

During the past year experiments have been conducted throughout Ontario in the departments of Agriculture, Horticulture, Forestry, Poultry-raising, Bee-keeping and Agricultural Chemistry. In Agriculture alone, experiments have been conducted upon over 4,850 farms. These figures show us the extent of the Union's work, and although not nearly all of the experimenters may have sent in reports complete in every detail, there are a great many of these who will be greatly benefited by what they have done. As a result of the material sent out by the Union, many a farmer has worked himself into a different variety of oats, wheat, corn, peas, or whatever the material may have been, which has meant a direct increase in the income of the farm. Not only the experimenter has benefited, but his results have encouraged others to try to increase the yield of their crops also. We do not hesitate to say that the work of the Experimental department of the College, through the experiments conducted by the members of the Union, has meant millions of dollars to the Province of Ontario; and this influence is also felt in the other Provinces of the Dominion. The growth of the Experimental Union, since it was first formed in 1880, has perhaps not been phenomenally rapid, but it has been steadily growing year by year, and we have every reason to believe it will continue to do so.

No better movement has ever been set on foot in this or any other country than that method by which the counties of this Province may be supplied with a trained agriculturist, to teach the subject in High Schools, and most of all to provide an "Agricultural Doctor" to whom the farmers may take their troubles and get the latest treatment for these troubles. These men, who have been placed in several counties of the Province of Ontario, are now looked upon by the people as one of the greatest assets of the county. Could not some experiments be conducted under the direction of these county representatives, and then the reports be given by the representatives at the annual meeting of the Experimental Union. Take for example, an experiment in the use of commercial fertilizers. The results from the Province as a whole might not be just satisfactory, whereas, if the experiments were conducted in each county, more care could be taken that the soil and conditions on the several farms were more uniform, thus producing more valuable results.

The beneficial results of the Union have been brought about by the co-operation among its members. And so will beneficial results appear in every line of farming when co-operation is practised to a greater extent. The idea that a good many farmers and others have, that it would be impossible for farmers to manage a co-operative business successfully, has done a great deal to hinder the growth of co-operation among farmers. But the results of co-operation in the fruit and dairy business and in other lines also, show that farmers are awakening to the advantages of co-operation. Co-operation among farmers may in some cases be hard on the middleman, but no farmer will begrudge him a farm in any part of the country, and there he can become a producer himself. And also, we as farmers do not stop to think, that if we were to band ourselves together, we might have four times as many farmers in our Government Houses as we have at the present time, and surely this would mean the advancement of agriculture.

With the advent of rural free mail delivery, the electric road, the telephone, and in many sections the supply of natural gas for fuel, the farmer certainly has a good many of the advantages enjoyed by his city friends, and without paying so dearly for them. All these later additions to farm life undoubtedly make it more enjoyable, and yet they appear to have brought with them somewhat of the hurry and bustle of the great city. And this makes it more necessary than ever before, that the farmer should be a man of education, in order to compete in a businesslike manner with men in other callings. There is no better place to secure this education than at the Ontario Agricultural College. It is not only the technical training which benefits the student, but also the broadening of his views along general lines, and that education acquired by coming in contact with many men who have come from places where the conditions, manners and customs are at least somewhat different from those surrounding the individual student in his own community.

Not least among the benefits to the experimenter is that habit of neatness which is taught him while conducting any experiment, and this, no doubt, has a tendency to make the farmer more neat in all his work, and in some instances may even have an influence upon his personal neatness. For I believe that the farmer has been in the past debarred of his proper social position, owing to the fact that farmers, as a class, are not careful enough about their personal appearance. He, no doubt, feels independent, but I think that as a rule, the farmer would be more highly respected if he wore a little better clothes. The price of farm produce for the last few years has been very good, and the farmer will feel more proud of his calling if he shows the city and town people by his manner and dress that he is enjoying the better reward he is getting for his labor. Ralph Connor's latest book, "The Foreigner," in speaking of the change that came over the little Galician girl, when she discarded her Galician garb and came forth as a Canadian young lady, says: "For such subtle influence does dress exercise over the mind, that something of the spirit of the garb seems to pass into the spirit of the wearer." The farmer has certainly no need to be ashamed of his calling, and it is his duty to see that the calling has no reason to be ashamed of him.

Again, I extend to you all a most hearty welcome to the Union meetings, and invite you to ask any questions and discuss the various topics freely. Let us try to have a most pleasant and profitable session; one that will make our business more profitable and the approaching New Year happier and brighter, because of our having met here. And let us strive towards the goal of perfect agriculture, and remember that, as a great man has said, "Upon the rise and fall of Agriculture depend the rise and fall of Empires."

G. S. HENRY: I am sure it is a pleasure for me to be here again at another meeting of the Experimental Union, and in a small way to take part in the programme. My mind has been drawn back this afternoon to the first day I visited the Ontario Agricultural College. After I had been here a day or two, in talking with my room-mate, who was a senior, while I was only a freshman, he said: "There is a great deal of good done here in one way and another, and the greatest things that are done by the College are due to Charlie Zavitz." (Applause). I had scarcely heard of Mr. Zavitz at that time. It was evident to a third year student at that time what great progress was being made along experimental lines under the direction of Mr. Zavitz, and I am sure we have every reason to say, at the present time, that double the work is being done and the results are much greater than they were ten or twelve years ago.

I cannot see my way clear to criticise the President's address except along the lines of his extreme modesty. I think it is hard for us to estimate the results that have come from co-operative experiments carried on here by the College. We all realize that agriculture in the Province of Ontario is in the process of evolution.

We are changing from the old line of grain growing, and the growing of what are really called "raw materials," to the production of the finished product.

Ontario is ceasing to take any great part in the production of the cereal foods for selling from the farm. We are now looking more to stock raising and dairying, and while this process has been going on, the College and the Experimental Union have a mission to perform. Ex-students and students have a part in this work, and we realize that they have been playing their part in educating the average farmer and showing him how he can get better results for his labor. Farming is not just the production of wheat, but there is an art in agriculture and a science that needs care and deep study if we are to get the very best results.

Possibly that part of the President's address which deals with co-operation is one of the most striking features. Co-operation in experimenting reaches the farmer and shows him the advantages that are to be derived from a more thorough study of crops and a better system of cropping.

I would like to impress upon the students, especially the freshmen, that they should attend the Experimental Union, and should not be backward in getting up and asking questions. The result to be obtained by these meetings largely depends upon the interest the audience takes in them, and the questions that are asked and the discussion of the various papers and subjects that are brought before us. The reports of the experimental work that has been carried on throughout the Province by Professor Zavitz are very important, and we will have a meeting of the Union that will go down to history as a successful one, if we all do our part in asking questions and in getting and giving all the information possible.

I am sure I am very pleased to be here this afternoon. I am looking forward to these meetings of the Experimental Union with great interest as I have always done in the past. I come back year after year and find that with every year I get some new ideas in agriculture by rubbing up against those who have been working out problems for themselves. I gain information that is of value to me, not only from a practical nature but from a social and educational standpoint. I trust we will all get splendid results from this meeting, and that the subjects brought up will be discussed freely and intelligently.

THE PRESIDENT: I am very glad that Mr. Henry emphasized that last point, because I think the success of a meeting depends upon the audience largely. We want a full and free discussion and we invite all to take part. If you do not ask questions, you may be keeping back some thought which would be of much value to others.

RESULTS OF CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

BY C. A ZAVITZ, PROFESSOR OF FIELD HUSBANDRY, O.A.C., GUELPH.

The co-operative experiments in Agriculture were conducted on a greater number of Ontario farms in 1909 than in any year previous. No less than 4,856 men were actually engaged in conducting these experiments during the past year. This is an increase of 430 over 1908, and of 820 over 1907. Owing to lack of help, finances and material, we were unable to supply 739 applicants with material for experimental purposes in 1908, and 841 applicants in 1909. We are greatly pleased with the continued interest in this important work throughout the country, and with the enthusiasm by which it is carried on.

The spring of the present year was exceptionally cold and wet, which thus prevented the usual early seeding of some of the crops. Many of our farmers feared that owing to the lateness of the season, the crops would probably be considerably below the average in productiveness. We are pleased to state, however, that in most cases the farm crops in Ontario have given yields which are about normal. In some localities, however, the dry weather in the middle of the summer caused some of the farm crops, especially potatoes, to be comparatively light in yield. I think I am safe in saying that never since the co-operative work of the Experimental Union was started in 1886 has there been a larger number of satisfactory reports received in any one year. We are greatly pleased with the character of the work of a large number of our experimenters. They deserve great credit for successfully conducting the various experiments, and farmers owe much to these men for the valuable reports which they furnish, and which are here presented in a summary form. We commend these reports as being worthy of very careful study by the people of Ontario who are concerned in the growing of farm crops. As these co-operative experiments have been conducted in every county and district, and probably in every township of the Province during the past year, the results should be not only of local but also of general interest, and should give service of great value. The Experimental Union has had a marked influence in increasing the market values of the farm crops of Ontario. Not only does it aid the experimenters themselves, but it also helps to develop the whole country. Besides the financial aid which it gives, it also encourages neatness and method in work, close observation, accurate calculation, thoughtful inquiry, and many other important agencies which help so much in the education of the people.

The co-operative work is, to a large extent, the outgrowth of the experimental work done at the College, and it is principally based on the results obtained at the College through a long series of years. The experimental work in Field Agriculture was started at the College in 1876, and since that time it has gradually developed along various lines until at present fully two thousand plots are used annually in experiments with grains, fodder crops, grasses, clovers, roots and potatoes; in testing manures and fertilizers; in comparing different methods of cultivation, etc., with the object of obtaining information regarding the best varieties; the most productive selections of seed; the best time to sow the various classes of crops; the most important methods of cultivation; the best mixtures of seed for the production of grain, green fodder, hay and pasture; the best methods of maintaining and increasing the fertility of the soil, etc. Since the beginning of the work, each of fully two thousand varieties of farm crops has been tested at the College for at least five years· A large amount of work is now being carried on in the improvement of the best varieties of farm crops by means of systematic selection and by cross-fertilization. In past years, those varieties of crops which gave the best results at the College, have been used in the co-operative experiments. Some of the new strains obtained by selction are now being incorporated into the work, and we hope before long to be able to distribute some of the very best of the new hybrids which are being created in the plant-breeding nursery in the experimental grounds. Besides the testing of varieties throughout Ontario, co-operative experiments are also carried on with mixtures of grains and grasses, with manures and commercial fertilizers, with methods of cultivating the soil, etc.

In the spring of each year circulars on the co-operative work are distributed by the agricultural committee appointed by the Union. These circulars give a list of all the experiments for which material can be furnished. They are sent by mail to the members of the Experimental Union; to the experimenters of former years who have done satisfactory work; to leading farmers whose names have been suggested by secretaries of Farmers' Institutes, secretaries of Agricultural Societies, principals of Collegiate Institutes, and inspectors of Public Schools. They are also sent to all persons asking for information regarding the co-operative work; and to all the newspapers of the Province. In this way, the work is brought to the notice of a very large proportion of the farmers of Ontario. The following gives the list of the co-operative experiments in agriculture, conducted throughout Ontario in 1909.

CO-OPERATIVE EXPERIMENTS IN 1909.

Spring Grain Crops.	Plots.
1 —Testing three varieties of Oats	3
2*a*—Testing three varieties of six-rowed Barley	3
2*b*—Testing two varieties of two-rowed Barley	2
3 —Testing two varieties of Hulless Barley	2
4 —Testing two varieties of Spring Wheat	2
5 —Testing two varieties of Buckwheat	2
6 —Testing two varieties of Field Peas	2
7 —Testing Emmer and Spelt	2
8 —Testing two varieties of Soy, Soja, or Japanese Beans	2
9 —Testing three varieties of Husking Corn	3
Root Crops.	
10 —Testing three varieties of Mangels	3
11 —Testing two varieties of Sugar Beets for feeding purposes	2
12 —Testing three varieties of Swedish Turnips	3
13 —Testing two varieties of Fall Turnips	2
14 —Testing two varieties of Carrots	2
Forage, Fodder, Silage and Hay Crops.	
15 —Testing three varieties of Fodder and Silage Corn	3
16 —Testing three varieties of Millet	3
17 —Testing two varieties of Sorghum	2
18 —Testing Grass Peas and two varieties of Vetches	3
19 —Testing Rape, Kale and Field Cabbage	3
20 —Testing three varieties of Clover	3
21 —Testing two varieties of Alfalfa (Lucerne)	2
22 —Testing four varieties of Grasses	4
Culinary Crops.	
23 —Testing three varieties of Field Beans	3
24 —Testing three varieties of Sweet Corn	3
Fertilizer Experiments.	
25 —Testing fertilizers with Potatoes	8
26 —Testing fertilizers with Swedish Turnips	6
Miscellaneous Experiments.	
27 —Sowing Mangels on the level, and in drills	2
28*a*—Testing two varieties of Early Potatoes	2
28*b*—Testing two varieties of medium ripening Potatoes	2
28*c*—Testing two varieties of Late Potatoes	2
29 —Testing three grain mixtures for grain production	3
30 —Testing three mixtures of Grasses and Clover, for hay	3
Autumn Sown Crops.	
31 —Testing three leading varieties of Winter Wheat	3
32 —Testing two leading varieties of Winter Rye	2
33 —Testing five Fertilizers with Winter Wheat	6
34 —Testing Autumn and Spring Applications of Nitrate of Soda and Common Salt with Winter Wheat	5
35 —Testing Winter Emmer with Winter Wheat or Winter Barley	2
36 —Testing Hairy Vetches and Winter Rye as Fodder Crops	2

Most of the plots were one rod wide by two rods long, being exactly one-eightieth of an acre in size. In former years, some plots consisted of one-tenth acre and a few of one-half acre in size, but for most experiments these were found less satisfactory than the small plots.

For the following summary, only the results given in the most reliable reports were used. Many of these reports have been sent in by men who have had a large amount of practical experience on the farm; have had the advantages of a good education, and by means of conducting experiments in former years have become quite expert in the work. It should be remembered, however, that while only the good reports of carefully conducted experiments have been used for publication, many of those not included in the summary show that the individual experimenters must have obtained a considerable amount of value from the work. It frequently happens that, owing to some unavoidable accident, the experiment may have been injured to some extent so that the results could not be used in the general summary, and yet the experiment may have furnished useful lessons to the farmer conducting it. In all cases experimenters obtain much more information from the work which they have carried on than can be given in a tabulated report.

Very carefully prepared instructions for conducting the co-operative work were furnished each experimenter in the spring of the year. While these instructions were not so elaborate but what they could be carried out in every detail, they were sufficiently comprehensive and specific to cover the important parts of the experiment in the search for reliable and valuable information, from a practical point of view. Besides various questions regarding the details of the experiments, the different experimenters were asked to give their decision as to the relative standing of the different varieties, mixtures, methods of cultivation, and fertilizers, taking everything into consideration bearing on the various phases of the experiments and on their own knowledge of their requirements regarding the soils of their farms, the systems of farming practised, the requirements of the markets, etc. The summary of the answers to this line of inquiry is presented in the tabulated results under the heading of comparative value.

GRAIN CROPS.

About six million acres of land in Ontario are devoted annually to the production of grain crops. The market value of the grain crops grown in the Province in 1908 amounted to approximately $100,000,000. It will therefore be seen that the grain crops occupy an exceedingly important place in the agriculture of the Province. It has been the aim of the department of Field Husbandry at the College and of the agricultural committee of the Experimental Union to conduct experiments which would be of great value in increasing both the quality and the yields per acre of these crops throughout the Province. It is interesting therefore, to notice that the average annual increase in yield per acre of each of our principal grain crops of the last twelve years, as compared with the twelve years previous, is as follows:

Barley	22.7	per cent.
Oats	15.1	" "
Winter Wheat	11.3	" "
Average	16.4	

As these estimates are obtained from the reports of the Bureau of Industries for Ontario, it seems to indicate very strongly indeed that there are agencies at work in Ontario which are having a very marked influence on the crop production of the Province.

TABLE NO. I.—GRAIN CROPS.

Experiments.	Varieties	Comparative value.	Yield per Acre.		
			Straw.	Grain.	Grain.
			Tons,	Lbs.	Bus.
Oats, (133 tests).....	Siberian..	100	1.23	1,414	41.60
	Sensation	96	1.12	1,382	40.64
	Daubeney............	67	.96	1,302	38.28
Six-rowed Barley ... (30 tests)	O. A. C. No. 21.................	100	1.08	1,649	34.45
	Mandscheuri	88	1.10	1,578	32.88
	Oderbrucker	66	1.06	1,433	29.85
Two-rowed Barley .. (3 tests)	Hanna........................ ...	100	1.07	1,626	33.88
	Two-rowed Canadian	88	.69	1,454	30.28
Hulless Barley...... (15 tests)	Guy Mayle........	100	.87	1,574	26 24
	Black Hulless..................	81	.87	1,424	23.73
Spring Wheat....... (12 tests)	Wild Goose......................	100	1.27	1,334	22.23
	Red Fife..........................	74	1.05	1,117	18.61
Buckwheat .... (3 tests)	Rye	100	1.52	1,014	21.12
	Silver Hull	88	2.08	854	17.78
Emmer and Spelt.... (8 tests)	Common Emmer	100	1.08	1,815	45.38
	Red Spelt.........................	43	.98	1,190	29.76
Winter Wheat....... (21 tests)	Imperial Amber.................	100	1.42	1,447	24.11
	Abundance	84	1.27	1,433	23.88
	Bulgarian	68	1.20	1,312	21.86
	Nigger	55	1.37	1,311	21.85
Winter Rye.. ...... (10 tests)	Mammoth	100	1.55	1,572	28.07
	Common	61	1.44	1,239	22.12
	Washington......................	56	1.18	1,096	19.57
Field Peas........ (45 tests)	New Canadian Beauty	100	1.02	1,278	21.29
	Early Britain..............	88	89	1,234	20.56
Field Beans......... (13 tests)	White Wonder	85	1.65	1,802	30.04
	Marrowfat	100	2.00	1,762	29.36
	New Prize Winner	100	1.31	1,737	28.95
			Whole Crop.		
Corn for Grain ...... (10 tests)	Genesee Valley.	100	8.60	2,568	45.86
	Compton's Early.................	71	9.21	2,444	43.64
	King Phillip.....................	79	8.05	2,410	43.04
			Straw.		
Mixtures .... (7 tests)	Daubeney Oats, 34 lbs. per acre Mandscheuri Brly. 48 " "	100	1 11	1,518	....
	Siberian Oats, 25 " " Two-row.Can.Brly. 35 " " Wild Goose Sp.Wht. 22 " "	58	1 05	1,090	....
	Siberian Oats, 34 " " Two-row.Can.Brly. 48 " "	74	.96	1,037	....

In the table here presented, the yield of straw, as given in the second column, represents the total crop less the amount of grain, and therefore includes the chaff with the straw. The yield of grain is given in pounds and also in bushels per acre in order that the results may be more clearly understood, and that comparisons may be made between the different classes of crops as well as between the varieties of each class. Owing to the great variation in the weight per measured bushel of the different crops, it is easier to compare the results in pounds than in bushels per acre.

The average results of the successfully conducted co-operative experiments with varieties and with mixtures of grain crops are presented in Table I.

VARIETIES OF OATS. The oat crop is the most important of all the farm crops grown in Ontario at the present time. The area devoted to oats annually amounts to nearly 3,000,000 acres, and the market value approximates $40,000,000. About two hundred and fifty varieties of oats have been under experiment at the Ontario Agricultural College within the past twenty-one years. New varieties have been introduced from time to time, and after five years' tests the poorer kinds have been dropped, and those which have given the most satisfactory results have been retained in the tests. Nearly all of the varieties here referred to have been grown at the College for at least five years in succession, and a few of them have been under test for fully twenty years. Those varieties which have given the best average yields per acre at the College during the last five years are the Siberian, the Daubeney and the Alaska. The two first varieties, along with the Sensation, form the three varieties used in the co-operative experiments throughout Ontario in 1909. The Siberian oats were imported by the College from Russia in the spring of 1889. They possess straw of good length which usually stands up very well. The head is of a spreading character and the grain is white in color and has about 30 per cent. of hull. The Sensation variety of oats has nearly always produced a less yield of grain per acre, but the grain is quite attractive in appearance and is about the same in quality as the Siberian. The Daubeney variety is very early and is one of the best kinds of oats for mixing with the Mandscheuri barley for growing the two in combination, as these two grains require about the same length of season to reach maturity. The grain of the Daubeney oats, although a little slender in appearance, is of excellent quality, usually furnishing five or six pounds more meal per hundred pounds of grain than the Siberian or the Sensation, and about eight pounds more meal per hundred pounds of grain when compared with the Banner. The average results of the co-operative experiments with these three varieties in 1909 show that the Siberian gave an increase in yield per acre of about one bushel over the Sensation, and of three and one-half bushels over the Daubeney. The Siberian, as compared with the Sensation, also gave a larger yield of straw per acre, possessed a stiffer straw, and was more popular with the experimenters. According to the reports received from over the Province, the three most extensively grown varieties of oats in Ontario at the present time are the Banner, the Siberian and the Twentieth Century. It might be interesting to state that in connection with the Agricultural Societies of Ontario, in which prizes were offered for fields of standing grain in 1908, those varieties which secured thee greatest percentage of prizes were the Siberian and the Ligowa, fully three-fifths of all the entries in each variety receiving prizes.

Six-rowed Barley. The barley crop in Ontario has increased in market value from $4,812,194 to $12,900,689 during the past ten years, according to reports of the Ontario Bureau of Industries. In the same period, the area devoted to barley increased from 438,784 to 766,891 acres. The average annual yield of barley per acre for the last ten years has been fully one-fifth greater than that of the ten years previous. These large increases in areas and in yields per acre are undoubtedly due, to a considerable extent, to the introduction of the Mandscheuri variety by the Ontario Agricultural College, and to the distribution of the same through the medium of the Experimental Union.

One hundred and fourteen named varieties of barley have been grown in the Experimental department at the College for at least five years in succession, and some of them have been grown in each of twenty years. In the spring of 1889, one pound of the Mandscheuri barley, which was obtained from Russia, was sown on a small plot in the Experimental department to be tested with sixty other varieties. It produced comparatively stiff straw and gave a large yield of barley which was of good feeding quality, being fairly thin in the hull and plump in the grain. It has continued to give good results, the average for twenty-one years being 70.5 bushels of grain per acre in the experimental plots. Small quantities of the Mandscheuri barley have been distributed in each of the past sixteen years to those farmers who applied for the experiment with barley in connection with the Experimental Union. From these one pound lots so distributed, there are now about 570,000 acres of the Mandscheuri barley grown in Ontario annually. The introduction of this variety has had a wonderful influence on the barley production of this Province.

In the spring of 1903, 9,972 selected grains of the Mandscheuri barley were planted by hand at equal distances apart, in the Experimental department at the College. When the plants were ripe they were carefully examined, and thirty-three of the most promising ones were selected, harvested and threshed separately. In 1904, thirty-three separate lots of barley were grown from the plants selected in the year previous. From that time forward, only the best strains were grown in the tests as follows: Fourteen in 1905, eight in 1906, seven in 1907, three in 1908, and three in 1909. In one instance over forty bushels of barley were grown in 1905 as the product of one seed planted in the spring of 1903. Of all the selected strains, the one which is known as the O.A.C. Number 21 has made the best record. In each of the last three years it has actually given better results than the Mandscheuri variety in yield of grain, in freedom from rust, and in strength of straw in the co-operative experiments throughout Ontario. The grain is quite easily distinguished from that of the Mandscheuri barley.

We were able to trace several thousand bushels of this barley grown in Ontario in 1908 from the one pound lots of the O.A.C. Number 21 barley sent along with two other varieties to Experimental Union applicants in each of the two years previous. One farmer in Huron County harvested 900 bushels of the O.A.C. Number 21 barley in 1908, which was a third crop produced from one pound of seed sown in the spring of 1906. Farmers who have kept the barley pure had a large local demand for seed this spring from their neighboring farmers, and in some instances realized as high as $1.50 per bushel. It is quite probable that in a very short time the O.A.C. Number 21 barley will be grown more extensively than any other variety in Ontario. Not only do we receive excellent results from this barley in the co-operative experimental work, but we are also receiving most favorable reports from farmers who are now growing it as a field crop. From a large number of letters received last spring, there was not one but spoke very highly indeed of this barley, speaking particularly of its luxuriant growth, its stiffness of straw, and its power of giving high yields of grain.

Two-rowed Barley. It is only in a very few localities throughout the Province that the two-rowed barley is grown as a field crop. We find in our experimental work at the College that we obtain decidedly larger average yields per acre from the leading six-rowed than from the leading two-rowed varieties of barley.

From the average results of experiments over Ontario in 1909, it will be seen that the Hanna two-rowed barley made a very good showing indeed, but as there were only three successfully conducted experiments with the two-rowed barley, as compared with thirty of the six-rowed barley, it is hardly fair to make a close comparison between these two classes of grain. The Hanna two-rowed barley was also distributed throughout Ontario in 1908 and gave decidedly larger yields than the Two-rowed Canadian, in eight co-operative experiments of that year.

Hulless Barley. Some fourteen varieties of hulless barley have been under experiment at the College. These have been obtained from various countries of the world. The Black Hulless is the oldest and probably the best known variety in Ontario. It is, however, very weak in the straw and has not given as good results in yield of grain per acre as the Guy Mayle variety in the experimental work at the College. In each of the past two years the Guy Mayle has given decidedly better yields of grain per acre, has produced stiffer straw, and has been more popular with the experimenters than the old and well known Black Hulless variety.

Spring Wheat. Only two varieties of spring wheat were distributed in the spring of 1909. These represent two distinct classes or types. The Wild Goose is a durum wheat and is especially suitable for the production of macaroni, of cereal foods, or of flour for the use of blending with the flour of other varieties. The Red Fife is one of the finer grain wheats which produced flour of good color and of excellent quality. In the experiments at the College, the Wild Goose variety usually yields considerably more than the Red Fife. This generally holds true throughout Ontario in connection with the co-operative experiments. In the average results of twelve experiments conducted in 1909, the Wild Goose gave about three and one-half bushels per acre more than the Red Fife variety. It is probably quite safe to say that these two varieties are the most extensively grown of all kinds of spring wheat now under cultivation in the Province.

Buckwheat. The area devoted to buckwheat in Ontario has been gradually increasing from 88,266 acres in 1901 to 140,605 acres in 1908. In each of two years we have distributed the Silver Hull and the Rye buckwheat throughout Ontario for co-operative experiments. The average results show that the former was surpassed by the latter by 5½ bushels per acre in 1908 and by 3.3 bushels per acre in 1909. The Rye, Sand, or Notched buckwheat, although considerably grown in some countries, has not been used in the experiments at the College until within the last few years, during which time it has surpassed the Silver Hull considerably in yield of grain per acre. The Rye buckwheat is grown quite extensively in the Province of Nova Scotia.

Emmer and Spelt. Although these two classes of wheat have been grown for a very long period in some of the eastern countries, their cultivation in Canada is comparatively recent. They represent two classes of wheat which have been studied more particularly for the production of feed for farm stock than for the production of flour. When threshed, there is not a clear separation of the grain and the chaff, but both come from the machine together and are afterwards ground into meal. The Emmer usually possesses about 22 per cent. of hull or chaff and the Spelt about 30 per cent. It will therefore be seen that the amount of hull on the Emmer is considerably less than that on the average variety of oats, which usually runs about 30 per cent. Emmer and Spelt have been distributed throughout Ontario for co-operative experiments in each of the past six years, the following being the yields per acre from the two varieties respectively: 1904, 2,274 lbs., 1,263 lbs.; 1905, 1,589 lbs., 1,276 lbs.; 1906, 1,578 lbs., 1,106 lbs.; 1907, 1,768 lbs., 952 lbs.; 1908 1,731 lbs., 1,002 lbs.; and in 1909, 1,815 lbs., and 1,190 lbs. It will therefore be seen that the Emmer has surpassed the Spelt in yield of grain per acre to a very marked extent. In both the experiments at the College, and also throughout Ontario, the Common Emmer forms a very close rival indeed to the best varieties of oats and the best varieties of barley in yield per acre; in fact Emmer has surpassed both of these grains on several occasions, of which 1909 is one.

Winter Wheat. Four varieties of winter wheat were distributed in the autumn of 1908 to those farmers who wished to test some of the leading varieties on their own farms. The Imperial Amber gave the greatest yield per acre in the co-operative yields throughout Ontario in 1907 and in 1908, as well as in 1909. It also came first in popularity with the experimenters in each of these years. In popularity there was not very much difference between the Imperial Amber and the Abundance varieties during the past year. The Dawson's Golden Chaff, which we distributed for co-operative experiments throughout Ontario in each of twelve years, has not been included in the co-operative tests since 1906. According to extensive inquiries which we have made this year, the Dawson's Golden Chaff is still the most popular and the most extensively grown variety of winter wheat in the Province.

Winter Rye. In the experiments throughout Ontario, the Mammoth White surpassed the Common rye by an average of five bushels per acre in 1907, 5.4 bushels per acre in 1908, and 6 bushels per acre in 1909. The Mammoth variety of winter rye is a very vigorous grower and has been very popular with the experimenters.

Field Peas. For three years we distributed no field peas throughout Ontario, except in those districts where the pea weevil had not yet been found. In each of the past four years, however, we have complied with practically all requests for peas for experimental purposes. We received for this experiment fifty-five good reports in 1906, forty-two good reports in 1907, fifty-three good reports in 1908, and forty-five good reports in 1909. We have compared the Early Britain and the Canadian Beauty varieties in our co-operative experiments throughout Ontario in each of seven years, and the average annual results show that in five of these years the Early Britain surpassed the Canadian Beauty variety in yield of grain per acre. In 1909, however, it will be seen that the Early Britain was surpassed by the New Canadian Beauty by about three-quarters of a bushel per acre. As the straw of the Canadian Beauty is longer than that of the Early Britain, and as the season of 1909 was rather unfavorable for the production of a large amount of straw, the last named variety did not do nearly as well as usual this season. The Canadian Beauty is a large, smooth, handsome pea which is very saleable. The peas of the Early Britain variety are of a brown color and are not as attractive as those of the Canadian Beauty variety. I am informed, however, by Mr. Murton, of Guelph, that the Early Britain is a very choice variety for the production of split peas, the grain being of a rich yellow color after the skin has been removed.

Field Beans. The area devoted to field beans in Ontario, although not extensive, comprises about 50,000 acres annually, and the market value of the crop usually amounts to more than a million dollars. Upwards of thirty varieties have been grown at the College, and three of the leading kinds were used in the co-operative experiments throughout Ontario in 1909. The tabulated results show that the highest yield this year was produced by the White Wonder with an average of 30 bushels per acre. It will also be noticed that, although the White Wonder surpassed both the Marrowfat and New Prize Winner in yield of grain per acre, it was not quite as popular with the experimenters as either of those varieties, as will be noticed under the column of comparative value in the tabulated results. This is probably owing to the fact that the White Wonder possesses rather a short straw, and the weather conditions of the past season were more favorable for a longer strawed variety. Although the White Wonder gave a good yield of grain, the plants were undoubtedly rather short and would cause more inconvenience in harvesting.

Soy Beans. The past season has been very unfavorable for the growth of the soy beans in Ontario. Although seed of each of two varieties was distributed in the spring, no reports have been received which could be properly summarized for presentation in tabulated form. One man in Lambton County had a yield of 20 bushels of grain per acre of the Early Yellow variety in the past season, which was about five bushels per acre more than the yield obtained from the same variety at the College.

Corn for Grain. Fully one-half of the corn grown in Ontario is raised for the production of ripened grain. As the different varieties of corn vary so much in the time which they require to reach maturity, etc., many of them are quite unsatisfactory for grain production in the Province. Three comparatively early varieties were selected and distributed for the co-operative experiments in the spring of 1909. A number of experimenters reported the yields of the whole crop and of the husked ears, but there were just ten experimenters who conducted the experiment according to the directions in all details and furnished full and satisfactory reports. It will be seen from the foregoing table that the greatest yield was produced by the Genesee Valley, the second largest by the Compton's Early, and the lowest by the King Phillip. These are all flint varieties. The Genesee Valley is an eight-rowed yellow, the Compton's Early a twelve-rowed yellow, and the King Philip an eight-rowed reddish corn. The Genesee Valley was the most popular variety amongst the experimenters. According to the reports, the Genesee Valley and the King Phillip both ripened throughout the Province, but the Compton's Early reached only the firm dough condition, in the average of all the experiments. According to the reports received, the King Phillip grew to a height of three inches, and the Compton's Early to a height of six inches over the Genesee Valley. It will be seen that the corn produced a greater yield of grain than any of the other classes of grain crops under experiment in 1909.

MIXTURES OF GRAIN FOR GRAIN PRODUCTION.

A large amount of experimental work has been carried on at the Agricultural College to determine the comparative values from growing grains in mixtures as against the growing of the same kinds of grain separately. A study has also been made of the various classes of varieties of grain, in order to ascertain which kinds can be mixed together with the best results for green fodder, for hay, and for grain production. For the details of these results, the reader is referred to the Annual Reports of the Ontario Agricultural College. For the production of grain, experiments show that when different classes of grain have been mixed together they have yielded more heavily in nearly all cases than when grown separately. Of the various classes used, the highest yield has been obtained from oats and barley. Of the different varieties which have been included in this experiment, the mixture of Mandscheuri barley and Daubeney oats has been one of the most satisfactory up to the present time. By means of cross-fertilization we are endeavoring to originate a variety of six-rowed barley at the College which will mature at about the same time as our leading varieties of oats, such as the Banner and the Siberian. In our efforts we are very much encouraged and believe that we have now secured a new hybrid barley which is comparatively stiff in the straw, a vigorous grower, a good yielder, and a variety which will mature about eight days later than the

Mandscheuri, and which will probably answer well for mixing with some of the leading varieties of oats. This new hybrid, however, is as yet only grown in our small plots and will probably not be ready for distribution in connection with the Experimental Union work until 1911 or 1912.

For five years in succession we have used three different mixtures of grain in order to compare the results of these mixtures throughout the Province, and in order to give the farmers a better opportunity to study the results of the same. The mixtures have been the same in each of the five years. The results of the experiment for 1909 are as follows:

Mixtures.		Comparative value.	Yield per acre.	
			Straw.	Grain.
			tons.	lbs.
Daubeney Oats	34 lbs per acre	100	1.11	1518
Mandscheuri Barley	48 "			
Siberian Oats	25 "	58	1.05	1090
Two-rowed Canadian Barley	35 "			
Wild Goose Spring Wheat	22 "			
Siberian Oats	34 "	74	.96	1037
Two-rowed Canadian Barley	48 "			

It is interesting to know that the combination of Mandscheuri barley and Daubeney oats has given the greatest yield of grain per acre in each of the past five years. In 1909 this mixture gave a yield of more than 500 pounds of grain per acre more than either of the other two mixtures. In each of the five years the mixture of the Mandscheuri barley and the Daubeney oats has been decidedly the most popular with the experimenters. The area in Ontario which is being used for mixed grain is increasing from year to year, and we notice from the report of the Bureau of Industries for 1909 that there were no less than 474,530 acres devoted to mixed crops in the Province during that year.

VARIETIES OF POTATOES.

We learn from the November report of the Census and Statistics office of the Department of Agriculture at Ottawa that in 1909 the area devoted to potato growing in Ontario was 26 per cent. greater than that of the Province of Quebec, and about equal to the combined areas used for the growing of potatoes in Nova Scotia, New Brunswick, Prince Edward Island, Manitoba, Saskatchewan and Alberta. We also learn that the estimated value of the potato crop grown in Ontario in 1909, as in 1908, was slightly over twelve million dollars. It will therefore be seen that the potato crop is an important one in this Province.

In connection with the co-operative experiments in 1909, the various experimenters were asked to furnish the names of those varieties which are most extensively grown in their counties. The following gives the names and the order of the varieties which were mentioned the greatest number of times: 1, Rural New Yorker No. 2; 2, Empire State; 3, Carman No. 1; 4, Beauty of Hebron; 5, Early Rose; 6, Delaware; 7, American Wonder; 8, White Elephant; 9, Early Ohio; 10, Carman No. 2; 11, Irish Cobbler; and 12, Sir Walter Raleigh. From inquiries made in each of the past three years, the Rural New Yorker No. 2 has been mentioned first and the Empire State second each time as being the varieties which are the most extensively grown throughout the Province. In 1907, the American Wonder was mentioned as third, and in 1908 the White Elephant as third, and in 1909, the Carman No. 1 as third. These are both white potatoes which yield well and are of good quality. If the farmers of Ontario would select a few of the very best varieties of potatoes and grow those varieties almost exclusively for their general crop, the products would be more uniform and better prices would be realized.

In the spring of 1909, the Experimental Union distributed two varieties of late, two varieties of medium ripening, and five varieties of early potatoes for experimental purposes. Only two varieties were sent to each experimenter, but in each group of potatoes one variety was distributed throughout and used as a basis of comparison in summarizing the results. A very large number of applications were received in the spring of the year and many valuable reports of successfully conducted experiments reached the College this autumn.

Table II. gives the average results of the co-operative experiments with varieties of potatoes conducted on about four hundred farms throughout Ontario in 1909.

TABLE II.—POTATO EXPERIMENTS.

Experiments.	Potatoes.	Comparative Value.	Per cent. of small Tubers.	Mealiness when cooked.	Bushels of whole crop per acre.
Late Varieties (73 tests)	Empire State	100	11	100	177.73
	Dempsey's Seedling	85	12	93	154.88
Medium Varieties (96 tests)	Burpee's Extra Early	100	10	100	193.60
	Rose of the North	92	11	92	192.03
Early Varieties (220 tests)	Extra Early Eureka	100	11	89	181.46
	Early Puritan	88	13	100	155.67
	Early Fortune	80	12	89	151.00
	Early Andes	86	11	95	126.35
	Early Ohio	78	12	86	122.18

The tabulated results show that of the average of seventy-three experiments, the Empire State gave practically 23 bushels of potatoes per acre more than the Dempsey's Seedling variety. The Empire State also surpassed the Dempsey's Seedling in mealiness and in popularity with the experimenters. It is quite probable that both of the late varieties of potatoes would have produced larger yields per acre in 1909 had it not been for the cold, backward spring and the early autumn frost, which occurred in some localities about the end of August, and in some instances froze the potato tops while they were still green. The Empire State potatoes not only give a good yield per acre, but they are of excellent quality, and owing to their good shape and white color, sell more rapidly on the market than some of the other varieties.

Of the two varieties of medium ripening potatoes tested over Ontario during the past year, the Burpee's Extra Early has taken the highest place in yield per acre as it did in each of the past two years. The potatoes were also of a little better quality and were more popular with the experimenters than those of the Rose of the North variety.

Two hundred and twenty good reports of successfully conducted experiments with early potatoes were received. The Extra Early Eureka, which occupied the highest place in 1907 and the second highest place in 1908, again comes to the top of the list in 1909 with an average yield of 181 bushels per acre. The Extra Early Eureka potatoes are roundish in form and of a white color and are very popular with the experimenters. The Early Fortune variety has occupied third place in yield per acre in the co-operative experiments with the early varieties for three years in succession. The Early Ohio variety, which is one of the best known and one of the most extensively grown early potatoes in Ontario at the present time, occupies the lowest place in yield per acre in 1909, the yield being nearly 60 bushels per acre less than that of the Extra Early Eureka.

Taking the results of the co-operative experiments both for this year and for other years into consideration, we wish to draw attention particularly to the most excellent results which have been obtained from the Empire State of the late, the Burpee's Extra Early of the medium, and the Extra Early Eureka of the early varieties.

SWEET CORN FOR HOME USE.

There is a great variation in the different varieties of sweet corn in stage of maturity, in the size and the color of the ears, the flavor and the juiciness of the grain, etc. In order to get fuller information on these points, upwards of fifty varieties of sweet corn have been grown and their table quality tested at the Agricultural College. A few of the choice varieties have been selected for co-operative experimental work. In the spring of 1909, three varieties were distributed for testing throughout Ontario. Table III. presents the average results of twenty-four co-operative experiments with the three varieties of sweet corn for the past season.

TABLE III.—SWEET CORN.

Experiment.	Varieties.	Comparative Value.	Number of Ears.	Number of days until ready for table use.	Table Quality.	
					Flavor.	Juiciness.
Sweet Corn....... (24 tests)	Golden Bantam.......	100	150	86	100	100
	Mammoth White Cory.	74	147	87	69	71
	Malakhoff............	45	136	85	56	65

Of all the varieties of sweet corn which have been tested at the Ontario Agricultural College, the Golden Bantam is the favorite variety for the table. The seed of this variety was first introduced and tested by the College about seven years ago. The ears are rather small, yellow in color, and possess eight rows. The corn is exceedingly tender and possesses an excellent flavor. In the co-operative experiments over Ontario in 1907 and again in 1908, the Golden Bantam was reported by the experimenters as possessing the best table quality and as being the choice of the varieties tested for home use. It will be seen from the foregoing table that it has also made an excellent record in 1909, occupying the highest place in both flavor and juiciness and also in popularity, when all points were taken into consideration. The Malakhoff variety of sweet corn was introduced from Russia into the United States through the Department of Agriculture at Washington and has been tested at a number of the experiment stations. It has been grown at the Ontario Agricultural College in each of the past six years and was distributed for co-operative experimental work throughout Ontario in 1908 and in 1909. The Mammoth White Cory has been grown in Ontario for a number of years, and is one of the best known early varieties of sweet corn in the Province.

FIELD ROOTS, FODDER PLANTS AND HAY CROPS.

The co-operative experiments included under this heading in 1909 were with mangels, sugar beets for feeeding purposes, swede turnips, fall turnips, carrots, fodder corn, sorghum, millet, grass peas, vetches, rape, kale, field cabbage, clover, Lucerne and grasses. The average results of the carefully conducted experiments with the most of these crops are here presented in tabulated form. It has been a difficult matter, however, to get full and accurate results from the experiments with grasses and clovers to present in this way. Table IV. is very interesting and furnishes good data. It should be of considerable importance, as there are no other places where results of similar comparisons can be obtained.

TABLE IV.—FIELD ROOTS AND FODDER CROPS.

Experiments.	Varieties.	Comparative value.	Yield per Acre. (Tons).
Mangels (7 tests)	Ferry's Yellow Leviathan	100	31.51
	Ideal	72	30.50
	Sutton's Mammoth Long Red	61	28.93
Sugar Beets (7 tests)	Rennie's Tankard Cream	100	24.95
	Bruce's Giant White Feeding	95	24.67
Swede Turnips (3 tests)	Carter's Invicta	97	25.25
	Steel-Briggs' Good Luck	100	25.00
	Sutton's Magnum Bonum	97	21.71
Fall Turnips (3 tests)	Red Top White Globe	88	29.45
	White Egg	100	28.00
Carrots (8 tests)	Steel-Briggs' Improved Short White	94	21.90
	Bruce's Mammoth Intermediate Smooth White	100	20.09
Fodder Corn (8 tests)	Henderson's Eureka	100	18.19
	White Cap Yellow Dent	94	12.63
	Sterling White Dent	78	12.48
Sorghum (4 tests)	Early Amber Sugar Cane	100	6.23
	Early Minnesota Sugar Cane	100	6.15
Grass Peas and Vetches. (4 tests)	Hairy Vetches	100	8.30
	Common Vetches	71	6.85
	Grass Peas	86	6.73
Rape, Kale and Cabbage. (4 tests)	Sutton's Earliest Drumhead Cabbage	100	16.76
	Dwarf Essex Rape	94	12.85
	Thousand-headed Kale	63	11.54

Mangels.—It should be stated in the beginning that the three varieties of mangels included in the co-operative experiments in 1909 represent three distinct types of roots, viz., the Long Red, the Intermediate and the Tankard. There has been an impression abroad that the Long Red mangel nearly always was capable of producing a larger yield of roots per acre than either of the other two classes here mentioned. In our experiments at Guelph during the past few years, we have found that some of the heaviest yielders of roots have belonged to the Intermediate and the Tankard classes. The College Report for 1908 shows that the Yellow Leviathan, which is an Intermediate in form and in length, and the Griewener variety, which is Tankard in form, occupied the highest place in average yield per acre of all the varieties grown for five years in succession. It will be seen from the accompanying table that the Yellow Leviathan also occupies the highest place in the co-operative experiments throughout Ontario for 1909. This was followed by the Ideal, which is a mangel of Tankard form, and which produced on an average one ton per acre less than the Yellow Leviathan. The Sutton's Mammoth Long Red, which is one of the best yielding long red mangels which has been grown at the College, came at the bottom of the list in average yield per acre in the co-operative experiments throughout Ontario in 1909, being surpassed by the Yellow Leviathan by about two and a half tons of roots per acre. The Yellow Leviathan has also given very excellent results in the co-operative experiments in past years. Not only does it give a large yield of roots per acre, but it has a compact form with but a few fibrous roots, and is of good keeping and feeding quality.

Sugar Beets for Feeding Purposes. Those varieties of sugar beets most suitable for feeding purposes, as well as those particularly suitable for the production of sugar, have been tested at the College for a number of years, and the roots of each variety have been analysed in at least five different seasons.

Those varieties grown for sugar production, produce roots which are comparatively small, which grow almost entirely under the ground and which give an average of about 15 per cent. of sugar while those varieties which are grown for feeding purposes, give a larger yield of roots per acre, grow more out of the ground, and are thus more easily handled and produce roots which have about two-thirds the sugar content as compared with the other class. The two varieties of sugar beets for feeding purposes which were distributed in the spring of 1909 were the Rennie's Tankard Cream and the Bruce's Giant White Feeding, the varieties being the same as in 1908. The results show that in each of these years there were seven successfully conducted experiments, and that the Rennie's Tankard Cream gave the largest average yield of roots per acre, although the difference was not very great in either year. According to the chemical analyses at the College, the Giant White Feeding has given an average of 7.8 per cent. sugar in the average of six years, and the Tankard Cream of 8.9 per cent. sugar in the average of five years.

Swede Turnips. The yield of turnips per acre was slightly larger in 1909 than in 1908. The Carter's Invicta and the Steele Briggs Good Luck varieties both produce roots of good form which are very suitable, not only for home use, but also for shipping to New York, Boston and other American markets to be used for domestic purposes.

Fall Turnips. The fall or soft turnips usually give large yields of roots per acre, but do not keep so well into the winter as the Swedish varieties. The Red Top White Globe again heads the list in the co-operative experiments in yield per acre throughout Ontario, although the White Egg variety was somewhat more popular with the experimenters.

Field Carrots. The old White Belgian has been almost entirely supplanted by the Intermediate White varieties, which produced larger yields per acre and are more easily harvested. The Steele-Briggs Improved Short White variety surpassed the Bruce's Mammoth Intermediate Smooth White carrot in the average of eight comparative tests throughout Ontario in 1909 by nearly two tons per acre.

Fodder Corn. The Henderson's Eureka variety of corn has been a very heavy yielder of fodder in the experiments at the College. It is one of the very best of the large late varieties of fodder corn which has been under experiment. The White Cap Yellow Dent is an earlier variety than the Eureka and is more suitable for the greater portion of the central part of Ontario. The Sterling White Dent is one of the very earliest varieties of dent corn of all those which have been grown at the College in past years. It has been specially bred as a suitable corn for northern districts, and amongst the very early varieties it is one of the most promising. Although the comparative results of the co-operative experiments show that the Henderson's Eureka occupies the highest, and the Sterling White Dent the lowest yields per acre, it must be considered that the Henderson's Eureka is only suitable on some of the very warmest soils in the extreme southern part of Ontario, and that the Sterling White Dent can be grown with satisfaction in those parts farther north in the Province than nearly all of the other varieties of dent corn.

Sorghum. A considerable number of sorghums, including different varieties of sugar cane, broom corn, kaffir corn, milo maize, Jerusalem corn, etc., have been grown at the College for several years in succession. Some of these, and especially the sugar canes, have given good results. In some localities throughout Ontario, sugar cane has been grown with a considerable amount of satisfaction as a fodder crop. The co-operative results over Ontario show exceedingly light yields for the sugar cane in 1909. The yields are very much lower than usual. In some localities, the sugar cane forms a close rival to the varieties of corn, under general cultivation.

Millet. The season of 1909 was very unfavorable for the growth of millet. Although three varieties were distributed in the spring for co-operative experiments, no full and satisfactory reports of successfully conducted experiments have been received.

Grass Peas and Vetches. The Hairy vetches gave an average yield of green crop per acre in the experiments throughout Ontario of 8.3 tons in 1909, 12.2 tons in 1908, 9.2 tons in 1907, 7.9 tons in 1906, 8.9 tons in 1905, and 5 tons in 1904. It will therefore be seen that the results for 1909 are not very different from the average of the past five or six years. The Hairy vetches, Common vetches, and Grass Peas have been tested over Ontario for a number of years under uniform conditions. The average results show that the Hairy vetches gave the greatest yield of green crop per acre. Much has been said regarding the growing of Hairy vetches in the United States and in Canada, but owing to the fact that the seed usually costs from five to six dollars per bushel, and that it requires from one to one and one-half bushels of seed to sow an acre, it is doubtful if the Hairy vetches will become extensively grown as a fodder crop in Ontario, unless seed can be obtained at a less cost per bushel. In some seasons very good results indeed can be obtained from growing the Hairy vetches for seed production in this Province, but at the present time nearly all of the seed is imported from European countries. Grass Peas make a very good fodder crop, and can sometimes be used for this purpose to advantage.

Autumn Sown Hairy Vetches and Winter Rye. In each of six years, the seed of Hairy vetches and Winter rye has been distributed throughout Ontario for co-operative experiments in testing these crops for fodder purposes. In the average of six years' experiments, the Hairy vetches produced slightly the larger yield of green fodder per acre, but in 1909 the larger yield was produced by the Winter Rye.

Rape, Kale and Field Cabbage. For six years in succession, twenty-five varieties of rape, kale, field cabbage, Brussels sprouts, etc., have been grown in the Experimental Department at the College. In these results, the Sutton's Earliest Drumhead cabbage has given the highest average yield of green crop per acre, when the seed was sown and treated in exactly the same way as that of rape. In each of the past two years, the Sutton's Earliest Drumhead cabbage has been incorporated in the work of the Experimental Union. The demand for the seed of the cabbage, kale, and rape was very limited each year, but the results of the two good reports of successfully conducted experiments in 1908 and of the four in 1909 show that the field cabbage gave a yield considerably higher than either the rape or the kale. Especially was this true in 1909, the yield from the cabbage being about one-third larger than that from Dwarf Essex rape.

Clovers. Three varieties of clover, viz., the Common Red, the Alsike, and the Mammoth Red have been distributed each year for some time past. As the Common Red usually produces two crops in the one year, and each of the others one crop per season, and as the Common Red is not apt to survive the second winter as well as the Mammoth Red, it is difficult to get accurate results which will form a good summary report. These experiments, however, are of considerable value to the experimenters, but the results do not form data which can be presented very satisfactorily in a concise tabulated statement, hence no summary has been given in this report.

Alfalfa or Lucerne. In growing Alfalfa at the College in each of twelve years, from 1896 to 1909, the average yield of green crop per acre has been about 21 tons, and the yield of cured hay per acre fully 5 tons. There has been an average of three cuttings per annum, or of thirty-six cuttings during the twelve years. Our co-operative work of the past shows that Alfalfa can be grown successfully on many of the farms of Ontario where the land is suitable, but it should always be remembered that Alfalfa requires land with a subsoil which is well underdrained, either naturally or artifically. Alfalfa seed, obtained from Turkestan, and also from the Panhandle, Texas, have produced strains which have given very good results indeed in the experiments at Guelph. The seed of both the Turkestan and the Common Alfalfa was distributed for co-operative experiments in the spring of 1908. In the spring of the present year, these two strains were sent to some of the experimenters, and seed of both the Panhandle and the Common varieties was distributed to others. We hope another year to be able to present some valuable reports on these different strains of Alfalfa as grown on different farms throughout the Province.

Grasses. The varieties of grasses which have been distributed during the last few years are the Tall Oat, Orchard Grass, Tall Fescue, Western Rye, Lyme Grass, and Timothy. The Tall Oat has usually produced a very early crop and a large yield of hay, but it is difficult to secure satisfactory returns for presenting in a concise tabulated statement. Experiments with the grasses, however, form some excellent object lessons, and supply valuable information to those who conduct the experiments and to others who have an opportunity of seeing the growing crops. These various experiments form centres of observation and most valuable object lessons in various parts of the Province, and we earnestly believe that they exert a most wholesome influence in various ways.

FERTILIZERS WITH FARM CROPS.

Any person who has had much to do in conducting experiments on field plots will, undoubtedly, realize the great difficulty in conducting tests of fertilizers with farm crops and obtaining as full information as he would desire on the subject. Much has been done in laboratory work in analyzing plants, soils and fertilizers, in the search for knowledge regarding the contents of the soil, the requirements of the plants, and the suitability of the fertilizers to meet all these needs. When the fertilizers are applied to the soil, however, they do not always work according to the conclusions of the chemist, drawn from his work in the laboratory. Not only do the crops vary largely in the amount of plant food which they contain, but the power of the different soils in giving up their plant food, and of the plants of making use of the same, also varies greatly. The fertilizers themselves also vary to a marked degree in both the amount and the availability of plant food which they contain. Amongst those institutions which have done a large amount of work in the application and study of fertilizers to the soil for different crops, might be mentioned the Rothamsted Experiment Station in England, the Experiment Station of the Royal Agricultural Society at Woburn, England, and the State Experiment Stations at New Brunswick, New Jersey, and at Wooster, Ohio. The work at these institutions, which has continued for many years and at great expense, supplies results which are valuable in furnishing certain information. The information obtained from these institutions, however, is limited in its application, and it seems practically necessary for each farmer to do a certain amount of experimental work of his own in securing information which experiments at other institutions cannot supply. If, however, elaborate experiments with fertilizers are planned for farmers to conduct, they will, in most instances find the work and the expense beyond their reach. Realizing this fact, some comparatively simple experiments were arranged in connection with the Experimental Union, seventeen years ago. While it is true that these experiments have not accomplished all that we would like to have fertilizer experiments accomplish, the same can be said regarding every fertilizer experiment on field plots which has ever been conducted in any country. The table gives a summary of nearly all of the experiments conducted through the medium of the Experimental Union, within the past seventeen years, including the tests of fertilizers in 1909 with turnips for the fourth year and with potatoes for the third year.

In each of the years, both the fertilizers and the seeds have been sent from the College to the experimenters. In every instance, the nitrate of soda and the muriate of potash have been applied at the rate of 160 pounds per acre, and the superphosphate at the rate of 320 pounds per acre. The mixture of complete fertilizer has been composed of one-third the amount of these fertilizers, making in all 213⅓ pounds. Both the Royal Canadian and the potato fertilizer used in 1909 with the potato crop, were applied at the rate of 320 pounds each per acre. In all cases, the nitrate of soda has been applied when the plants were about three inches in height, and all the other fertilizers at the time of sowing the seed. Farmyard manure has been used in the experiments of the past seven years. The advice to each experimenter has been to apply 500 pounds of average cow manure per plot, the application being equal to twenty tons per acre. The cow manure has been mixed with the soil to a depth of from four to five inches, and the fertilizers have been stirred in the soil to a depth of from one to two inches.

Table V. gives the chemical composition of the commercial fertilizers used in the co-operative experiments in 1909, as determined in the Chemical department at the College:

TABLE V.—COMPOSITION OF THE FERTILIZERS USED IN THE EXPERIMENTS IN 1909.

Fertilizer.	Percentage of Fertilizing Constituent.		
	Nitrogen.	Potash.	Phosphoric Acid.
Nitrate of Soda	15.67		
Muriate of Potash		50.9	
Superphosphate			15.36
Complete Fertilizer	3.92	12 73	7.68
Potato Fertilizer	3.19	6.30	9.25
Royal Canadian	3.83	10.15	5.38

Table VI. presents the average results of the co-operative experiments with fertilizers on different kinds of farm crops. For a detailed statement of the results of fertilizers with potatoes the reader is referred to Table VII.:

TABLE VI.—AVERAGE RESULTS OF FERTILIZER EXPERIMENTS.

Kind of Fertilizer Used.	Average yield per acre.								
	Fertilizer per acre.		Oats.	Winter Wheat.	Fodder Corn		Mangels	Swede Turnips.	Potatoes.
					Total.	Ears.			
	Weight.	Cost.	5 years 74 tests.	5 years 15 tests.	8 years 47 tests.	8 years 41 tests.	5 years 41 tests.	4 years 16 tests.	3 years 64 tests.
	Lbs.	$ c.	Bus.	Bus.	Tons.	Tons.	Tons.	Tons.	Bus.
Nothing...........	....	......	38.9	19.9	8.2	2.7	20.6	20.9	142.8
Nitrate of Soda....	160	4.80	46.3	23.8	9.4	3.1	26.5	24.0	168.6
Muriate of Potash..	160	4.00	43.8	22.9	9.4	3.0	24.6	24.7	176.5
Superphosphate....	320	3.92	43.6	22.7	9.0	3.1	24.2	26.1	174.9
Complete Fertilizer.	213	4.24	48.7	25.2	9.4	3.2	25.4	26.8	183.6
Potato Fertilizer...	320	5.52	....	....	......	....	....	....	182.7
Royal Canadian....	320	5.60	......	....	....	....	....	....	179.2
Cow Manure.......	40,000	6.00	....	27.1	....	....	....	29.0	191.1

In connection with the co-operative work, experiments have been conducted throughout Ontario with fertilizers on oats for five years, winter wheat for five years, fodder corn for eight years, mangels for five years, Swede turnips for four years, and potatoes for three years. The reports for 1909 are confined to the experiments with fertilizers with Swede turnips and with potatoes.

The cost of each fertilizer, as given in the table, represents very closely the present cost per acre for the fertilizers as used in the co-operative experiments. The quotations were based on the factory prices for quantities of one ton in each case. The twenty tons of cow manure would mean about twelve good sized loads per acre, and manure in Guelph has been selling at 50 cents per load, which is probably about the average for the Province. It is exceedingly difficult to place a price on farmyard manure, as in most cases it is not purchased, but is produced on the farm. Each person may place such value on the manure as he deems expedient, and study the results according to his own circumstances. It should be remembered that the freight on the fertilizers and the application of both the fertilizers and the manure are not taken into consideration in the foregoing statement, nor yet is there any account made of the future influence of the different fertilizers and the manure upon the land.

Fertilizers with Oats. Seventy-four good reports of successfully conducted experiments in applying fertilizers to oats were received during the five years in which this experiment was conducted over Ontario. The lowest average yield was obtained from the unfertilized land, 38.9 bushels per acre; and the highest average yields from the mixed fertilizer, 48.7 bushels; and the nitrate of soda, 46.3 bushels per acre. The unfertilized land produced the lowest yield per acre in each of the five years. The mixed or complete fertilizer gave the largest yield of oats per acre in the average results of this experiment in each of the five years in which it was conducted. Although the land which received the mixed fertilizer gave an average of 9.8 bushels of oats per acre more than the unfertilized land, still this increase was produced at a cost of about 42 cents per bushel, according to the present prices of fertilizers. It will, therefore, be seen that it is only in special years that these commercial fertilizers will give economical results with oats on the average land of Ontario. The mixed fertilizer gave a larger average yield than no fertilizer on heavy soils by 12.7 bushels per acre, on light soil by 10.2 bushels per acre, and on black mucky soils by 7.1 bushels per acre.

Fertilizers with Winter Wheat. In the co-operative experiments with different fertilizers applied to winter wheat, it will be seen that the greatest average yield per acre was produced from the application of cow manure. The complete fertilizer, however, when applied at the rate of only 213 pounds per acre, gave less than two bushels per acre below the cow manure. It will be observed that the land which received the complete fertilizer gave 5.3 bushels per acre more than that which received no fertilizer. According to the prices of fertilizers given in the table, the most economical increase in yield of winter wheat was made by the application of the mixed fertilizer, and even in this case the cost of the increased yield amounted to 82 cents per bushel.

Fertilizers with Corn. In the average of experiments in applying fertilizers with corn in each of eight years, during which time forty-seven complete and satisfactory reports were received, it will be seen that the yields of whole crop produced by the plots which received an application of nitrate of soda, muriate of potash, and mixed fertilizer, were equal, while a plot on which superphosphate was applied produced nearly half a ton less than the others, and that the largest yield of husked ears was obtained when the mixed fertilizer was applied to the land. The muriate of potash produced the corn at the least cost per ton, but even with this fertilizer it cost $3.33 on the average to produce each additional ton of fodder corn.

Fertilizers with Mangels. During the five years in which fertilizers were used with mangels, forty-one good reports of successfully conducted experiments were received. These show that the smallest average yield was produced from the unfertilized plot, viz., 20.6 tons per acre, and that the largest average yield was produced from the nitrate of soda, viz., 26.5 tons per acre. As in the case with corn, the unfertilized land gave the lowest yield in each year. The nitrate of soda produced the highest yield in four out of five years. The average of 197 bushels of mangels per acre, produced by the nitrate of soda over the unfertilized land, was obtained at a cost of about 2.4 cents per bushel. The nitrate of soda produced the largest yield on both heavy and light soils, but on the black loams the muriate of potash gave the highest yield of mangels. The nitrate of soda showed the greatest influence upon the light soils, as in the average of fifteen experiments the sandy land which was fertilized at the rate of 160 pounds of nitrate of soda per acre gave an average yield of 7⅔ tons per acre more than the land which was unfertilized.

Fertilizers with Swede Turnips. From the average results of the four years' experiments with fertilizers and Swede turnips, it will be seen that farmyard manure has given the largest, the complete fertilizer the second largest and the superphosphate the third largest yield of roots per acre. According to the prices given for the manure and the fertilizers in the foregoing table, the increased yield of turnips was produced at a cost of 62 cents per ton by the use of cow manure, and 72 cents per ton or 2.2 cents per bushel by the use of the complete fertilizer.

TABLE VII.—RESULTS OF EXPERIMENTS OF FERTILIZERS WITH POTATOES IN EACH OF THE YEARS 1907, 1908 AND 1909.

County.	Soil.	Bushels of Potatoes per Acre.							
		No Fertilizer.	Nitrate of Soda.	Muriate of Potash.	Superphosphate.	Complete Fertilizer.	Potato Fertilizer.	Royal Canadian.	Cow Manure.
1907.									
Lincoln	Sandy Loam	124.7	122.7	138.7	137.4	128.0	153.4	139.4	137.4
Nipissing	Clay Loam	125.4	152.0	156.0	149.4	182.7	165.4	160.0	189.4
Nipissing	Clay Loam	226.7	226.7	290.7	346.7	240.0	366.7	293.4	333.4
Parry Sound	Sandy Loam	85.4	94.7	114.7	120.0	137.4	109.4	134.7	133.4
Parry Sound	Clay Loam	161.4	288.0	245.4	229.4	300.0	202.7	245.4	340.0
Rainy River	Black Loam	100.0	170.7	170.7	202.7	270.7	233.4	128.0	169.4
Waterloo	Clay Loam	108.0	129.4	153.4	138.7	113.4	133.4	154.7	128.0
Middlesex	Sandy Loam	98.7	98.7	121.4	96.4	106.7	114.0	115.4	128.0
Essex	Light Sand	97.4	120.0	113.4	158.7	92.0	94.7	106.7	93.4
Thunder Bay	Clay Loam	160.0	200.0	170.7	186.7	209.4	166.7	213.4	157.4
Haldimand	Heavy	89.4	130.7	120.0	136.0	113.4	120.0	110.7	193.4
Lambton	Clay	69.4	120.0	157.4	104.0	130.7	109.4	101.4	93.4
Haldimand	Clay Loam	74.7	106.7	94.7	78.7	93.4	82.7	89.4	93.4
Simcoe		60.0	58 7	89.4	165.4	124.0	141.4	137 4	280.0
Huron	Clay Loam	70 7	77.4	70.7	101.4	80 0	78.7	74.7	96.0
Elgin	Sandy Loam	130.7	179.4	178.0	152.0	200.7	202.0	169.4	174.0
Parry Sound	Clay Loam	276.0	400.0	394.7	390.7	396.0	328.0	382.7	380.0
Oxford	Clay Loam	74.7	66.7	84.0	81.4	85.4	80.0	74.7	89.4
Welland	Black Sand,	64.0	52.0	100.0	93.4	85.4	124.0	80.0	100.0
Leeds	Sandy Loam	50.7	76.0	65.4	68.0	70.7	58.7	81.4	68.0
Kent	Clay Loam	46.7	58.7	45.4	101.4	78.7	112.0	110.7	68.0
Thunder Bay	Clay Loam	64.0	120.0	101.4	80.0	125.4	104.0	176.0	48.0
1908.									
Kent	Sandy Loam	293.4	346.7	384.0	276.0	360.0	310.7	317.4	278 7
Elgin	Sandy Loam	130.7	133.4	130.7	125.4	148.0	174.7	153.4	198.7
Lincoln	Sandy Loam	402.7	394.7	394.7	398.7	466.7	408.0	412.0	470.7
Lincoln	Heavy Sand	151 4	169.4	176.0	144.0	170.0	180.0	183.4	169.4
Oxford	Clay Loam	301.4	320.0	360.0	373.4	358.7	412.0	392.0	345.4
Lambton	Clay Loam	122.7	126.7	160.0	142.7	129.3	142.7	138.7	153.3
Elgin	Clay Loam	112.0	133.3	150.7	133.3	156.0	120.0	134.7	137.3
Grey	Clay Loam	76.0	131.3	101.3	188.7	167.0	200.7	178.3	285.3
Oxford	Sandy	160.0	170.0	224.0	173.3	311.3	149.3	177 3	200.7
Norfolk	Sandy Loam	108 0	116.0	137.3	130.7	132.0	128.0	146.7	154.7
Bruce	Sandy Loam	144.7	166.7	176.7	191.3	162.0	203.3	200.0	220.7
Ontario	Sandy Loam	42.7	93 3	66.7	72.0	82.7	118.7	46.7	66.7
Bruce	Gravelly Loam	165.3	188.7	194.0	234.7	193.3	189.3	224.0	181.3
Muskoka	Sandy	90.7	169.3	112.0	173.3	153.3	197 3	136.0	210.7
Northumberland	Clay Loam	154.7	186.7	233.3	166.7	213 3	166.7	170.7	233.3
Bruce	Sandy	128.0	156.0	136.0	138.7	137.3	160.0	138 7	158.7
1909.									
Waterloo	Light Loam	169.3	206.7	220.0	200.0	173.3	220.0	240.0	200.0
Leeds	Black Muck	186.7	213.3	266.7	238.7	266.7	277 3	280.0	306.7
Muskoka	Gravelly Loam	73.3	100.0	126.7	112.0	116.0	97.3	152.0	154.7
Leeds	Sandy Loam	358.7	350.7	342.7	353.3	356.0	388.0	358.7	418.7
Haldimand	Clay Loam	112.0	132.0	120.0	106.7	112.0	162.7	170.7	185.3
Wellington	Clay Loam	146.7	174.7	200.0	200.0	194 7	188.0	173.3	157.3
Elgin	Sandy Loam	120.0	146.7	157 3	152.0	166.7	162.7	157.3	160.0
Lambton	Clay Loam	217.3	222.7	230.7	226.7	214.7	226 7	216.0	240.0
Norfolk	Sandy Loam	122.0	141.3	194 7	184.0	157.3	170.7	173.3	165.3
Simcoe	Clay Loam	246.7	277.3	278.7	328.0	365.3	300.0	326.7	274.7
Simcoe	Sandy Loam	173.3	164.0	270.7	224.0	178.7	257.3	173.3	261.3
Waterloo	Clay Loam	55.3	97.3	111.3	108.7	89.3	86.0	103.3	69.3
Norfolk	Sandy	98.7	97.3	82 7	100.0	80.0	80.0	105.3	97.3
Kent	Clay Loam	152.0	162.3	162.7	142.7	179.3	143.3	165.3	157.3

TABLE VII.—Concluded.

County.	Soil.	Bushels of Potatoes per Acre.							
		No Fertilizer.	Nitrate of Soda.	Muriate of Potash.	Superphosphate.	Complete Fertilizer.	Potato Fertilizer.	Ropal Canadian.	Cow Manure.
1909—Concluded.									
Northumberland	Clay	340.0	413.3	404.0	366.7	453.3	386.7	349.3	349.3
Middlesex	Sandy	50.7	80.0	120.0	93.3	80.0	86.7	94.7	97.3
Muskoka	Sandy Loam	88.0	94.7	93.3	141.3	98.0	129.3	85.3	120.0
Elgin	Sandy	95.3	91.3	132.0	119.3	126.7	142.7	136.7	129.3
Dundas	Heavy Clay	249.3	289.3	282.7	264.0	320.0	297.3	262.7	280.0
Nipissing	Clay Loam	159.3	165.3	154.7	194.0	182.7	260.0	190.7	239.3
Dundas	Clay	208.0	225.3	226.7	200.0	197.3	217.3	220.0	237.3
Dundas	Clay Loam	166.7	213.3	168.0	168.0	186.7	193.3	208.0	200.0
York	Clay	82.7	82.7	70.0	106.7	119.3	99.3	91.3	105.3
Oxford	Sandy	84.0	94.7	96.0	92.0	100.0	81.3	90.7	93.3
Carleton	Loam	204.0	217.3	206.0	230.0	228.7	231.3	278.0	237.3
Oxford	Sandy	192.0	216.0	202.7	209.3	176.0	186.7	181.3	244.0

Fertilizers with Potatoes. In the experimental grounds at the Ontario Agricultural College, thirteen different kinds of fertilizers were used with potatoes for five years in succession. The average results with that experiment showed that the Royal Canadian fertilizer gave the highest, and the Potato fertilizer the second highest yield of tubers per acre. Based on this experiment, another was arranged and was also conducted for five years in succession, and the results show that the highest average yield of potatoes was obtained from the use of a mixed fertilizer, similar to the one used in connection with our co-operative work with other crops. This, however, was closely followed in yield by the Royal Canadian and by the Potato fertilizer. The last two are both complete fertilizers, each containing nitrogen, phosphoric acid, and potash. The Royal Canadian fertilizer is sold by the Capelton Chemical Co., Buckingham, Que., and the Potato fertilizer by the W. A. Freeman Co., Hamilton, Ont. In the spring of each of the past three years, both potatoes and fertilizers were distributed from the College to applicants throughout Ontario. From these experiments, reports of successfully conducted tests were received from twenty-two experimenters in 1907, sixteen in 1908, and twenty-six in 1909. The average results of the three years' tests are here presented in tabulated form. It might here be stated that the comparative results of the different fertilizers were quite similar in the three years. It will be seen from the summary table that of the commercial fertilizers, the three complete manures gave the highest results, and of these, the mixture composed of 53 pounds of nitrate of soda, 53 pounds of muriate of potash and 107 pounds of superphosphate gave a higher yield per acre than either the potato fertilizer or the Royal Canadian, each of which was applied at the rate of 320 pounds per acre. The highest yield of all in each of the past three years was produced by an application of cow manure at the rate of twenty tons per acre. The land thus treated gave an average of 48.3 bushels per acre more than the land which was unfertilized.

In accord with the prices given for the manure and the fertilizers in the foregoing table, the increased yield of potatoes was produced at a cost per bushel for complete fertilizer, 10.4 cts.; muriate of potash, 11.9 cts.; superphosphate, 12.2 cts.; cow manure, 12.4 cts.; potato fertilizer, 13.8 cts.; Royal Canadian fertilizer, 15.4 cts.; and nitrate of soda, 18.6 cts.

In each of the past three years, the majority of the experimenters tested the potatoes grown from all the fertilizers, and reported the results for both flavor and mealiness. It was found that the table quality was influenced but very slightly indeed by the fertilizers. In 1909, the potatoes were practically free from scab, except those which were grown with the cow manure, which, in some cases, were affected slightly. There was practically no rot during the past season. What little trace there was seemed to be more noticeable in the potatoes which received the cow manure, than those which had been treated with commercial fertilizers.

In 1909, of the experiments here reported, twelve were conducted on light soil and twelve on heavy soil. The average results from the two kinds of soil show the largest yields per acre on light soils from cow manure, muriate of potash and potato fertilizer, and from the heavy soils from complete fertilizer, potato fertilizer and cow manure. Taking all the experiments of the last three years into consideration, the cow manure has given high results on both the light and the heavy soils, and the potato fertilizer has shown up particularly well on the light lands. It should be stated that, in some individual cases, certain fertilizers gave a yield fully double that obtained from the land which was left unfertilized, while in other instances, the influence from the various fertilizers was comparatively small.

A MEMBER: Where does the American Banner oat come in?

PROF. ZAVITZ: The Siberian stands higher than the American Banner in our own experiments conducted at the College during the past five years, although a short time ago American Banner was the highest.

A MEMBER: Are you able to tell why Daubeney has made a low score in comparative value?

PROF. ZAVITZ: It has not yielded quite as well over Ontario this last year. Daubeney and Alaska are two of the very best of the early oats.

PRESIDENT CREELMAN: According to your report, the yield in winter wheat is very low this year. You have not more than the average of the Province. Surely your experimenters are better men than the average farmer.

PROF. ZAVITZ: The average of these twenty-one reports shows about three bushels more than the average yield of the Province for winter wheat for the last few years, but not much higher than this year. The average in the Province this year was twenty-four bushels per acre. We should remember that we have been doing a great deal with Dawson's Golden Chaff. It is the farmers' wheat. It is very stiff in the straw and a large yielder. Millers thought we were doing too much with Dawson's Golden Chaff, and we have not sent it out during the last few years, but it is decidedly the most popular, and it is grown the most extensively and I believe that if we had included the Dawson's Golden Chaff on the list at the present time, that variety would have given a yield of 27, 28, or 30 bushels per acre.

MR. BUCHANAN: Mr. Zavitz says that he is rather surprised that Emmer has not become popular more rapidly than it really has. At Farmers' Institute meetings, and in talking with the students, I have heard people say that Emmer is doing splendidly with them. Mr. Glendenning, of Ontario county, and Mr. Kerr, an ex-student, also of Ontario county, have spoken highly of Emmer. It is a much better crop than it looks when growing. When growing, the heads seem short and small and the straw rather slender, not a very vigorous or promising looking crop, but when it is harvested, the yield is much higher than is expected.

A Member: What land will Emmer do best on?

Prof. Zavitz: Emmer will do very well on a variety of soils. I think it will do best on good clay loam or sandy loam, but it is supposed to do comparatively well on rather poor land where other varieties of spring wheat will often do poorly. Emmer will stand later seeding than nearly all other kinds of cereals, such as oats, wheat and barley. According to our experiments, the order of seeding in the spring should be spring wheat, barley, oats, peas, and Emmer, for the best results in Ontario.

A Member: I notice by the reports that Emmer has given a yield of 1,850 pounds per acre, while barley only gave 1,649. Is there much difference in the percentage of hull of the different grains?

Prof. Zavitz: Emmer has about 22 per cent. of hull, barley about 15 per cent. and the average variety of oats about 30 per cent.

A Member: What about the feeding value of Emmer?

Prof. Zavitz: We have not made any experiments in feeding Emmer, but experimenters in the United States have found that they get very similar results from Emmer and barley, pound for pound.

President Creelman: Was the land used for the fertilizer experiments good land to start with?

Prof. Zavitz: We asked every experimenter to use the average soil of his farm. If a man is going to experiment on his own farm, it is to his interest to conduct the experiment on the average soil of his farm. In all reports received, the detailed results giving the kind of soil, etc., are furnished in every instance.

Prof. Harcourt: One point that is brought out is the cost of the increase. I think it should be mentioned that the effect of the fertilizers is not all gotten the first year. There is another point that might be mentioned. We notice, for instance, that in growing turnips the superphosphate gave 26.1 tons, and the complete fertilizer gave 26.8. That brings out clearly the characteristics of the turnip, and they require superphosphate. The great advantage of the individual study of this question by the experimenter, is that he gets an idea of the particular constituent that is required by the crop.

A Member: How do you apply the nitrate of soda?

Prof. Zavitz: The fertilizers were all sown broadcast. The muriate of potash and the superphosphate were sown at the time of sowing the crops, and the nitrate of soda was sown when the crops were three or four inches high. We asked each experimenter to stir the soil an inch or two in depth on all the plots at the time of applying the nitrate of soda.

Q.—Don't you expect more economical results on poor soil than you would on rich soil?

Prof. Zavitz: We often get very good results indeed from an application of fertilizer on pretty rich soil. I remember one report that I did not include in these summaries, because it was from a man who had only five acres of land, and he had been manuring this land very heavily in each of five or six years, using a large amount of farmyard manure each season, and so I considered it unfair to include it in with other reports of experiments conducted under more average conditions. That man received a large yield per acre all through, but there was as much influence from the fertilizers in that experiment as there was from almost any of the experiments on the average qualities of soil.

While it is true that farmyard manure has given the largest yield per acre, still there are many people who say they cannot get a sufficient amount of farmyard manure. They can often supplement the farmyard manure with commercial fertilizers to good advantage.

MR. FRASER: Why was not an account made of the results of using cow manure on mangels?

PROF. ZAVITZ: We started the experiments some years ago with oats, with corn, and with mangels, and did not include farmyard manure. Later on, we decided to include the farmyard manure for the other crops and tried to make the instructions as definite as possible. We asked the farmers to use cow manure in every instance.

PRESIDENT CREELMAN: Two years ago we were visited by nearly two score Scotch farmers who were appointed by the Agricultural Commission of Scotland to visit Canada and look into our conditions with the idea of taking home some thoughts that could be put into the form of a report for the benefit of agriculture in Scotland, and after they had visited from one end of Canada to the other, not only looking at the Agricultural Colleges and the Experimental Farms, but going to the ordinary farmer and trying to find the difficulties of the average farmer, they said to me before leaving, that the one thing they could not understand was that the farmers of the Province of Ontario should be content with producing our present average crops of wheat oats, peas, barley, and potatoes, when by the application of more manure, either barnyard or commercial fertilizers, they might, in many instances, produce twice the crop. They came to the conclusion that if they would expend every year from $5 to $10 per acre for fertilizers, year after year, it would pay. All the farmers in Scotland use a large quantity of commercial fertilizers as well as all they can raise in the way of farmyard manure.

Is it your experience that it would pay our farmers to spend $5 an acre each year for more fertilizers? Would that be a paying proposition in dollars and cents?

PROF. ZAVITZ: I think it would in some instances, and not in others. They would need to know pretty well what they were doing, and apply the right fertilizers to the right crops. I have great faith in the proper handling and application of farmyard manure, and in the use of leguminous crops in the rotations. Commercial fertilizers are valuable as supplementary to these.

We must remember that the land is more expensive in Scotland and in England, and if they only get the same crops as we do, they would probably not have enough to pay rent and the only way to get a margin is to use a good deal of fertilizer, and when they have high priced land and receive high prices for the crops, they can afford to use a large amount of fertilizer.

In Connecticut, Maryland, and New Jersey, the results from using commercial fertilizers are much more marked than they are here. I believe it is an excellent policy in Ontario to make the very best possible use of clover and alfalfa and of the farmyard manure, and to study carefully how we can use commercial fertilizers to supplement the clover and the farmyard manure, and wood ashes and other natural products of the farm, that we can get so easily and so cheaply if we only manage properly, and then to supplement these with some commercial fertilizers used in the very best way. I think the work we are doing is giving the farmers some most valuable information on the study of the soil and the economic use of fertilizers, especially with regard to mangels, and turnips and potatoes. I believe it is safest in Ontario first and foremost to give particular attention to our farmyard manure and to our leguminous crops, and then to study the use of commercial fertilizers to supplement these.

Prof. Harcourt: Whether $5 an acre or any other quantity could be used on the farms of Ontario, depends on cultivation as much as anything else. Fertilizing will never take the place of cultivation and unless the land is thoroughly cultivated the $5 is thrown away. And that is where the Scotch farmers are ahead of the Ontario farmers in the thoroughness of cultivation. They can put a large amount of fertilizer in the soil and can be sure they will make use of it, but on poorly cultivated soil, you may put it there, but you will not get the results. We can only use fertilizers economically when we give the very best cultivation, and unless we are prepared to give that cultivation, we had better keep the money in our pockets. Our commercial fertilizers should be looked upon as adjuncts to the plant food we already have in our leguminous crops and barnyard manure.

Mr. Buchanan: We must remember that in the Old Country the population is more dense and they can give a cultivation that we cannot afford to.

Prof. Zavitz: I wish to emphasize what has been said in reference to the cultivation of the land. I believe the cultivation has probably more influence than the fertilizers which we put into the soil. I have been greatly impressed with the great value of thorough cultivation from our own work in the Experimental department at the College. We have a regular rotation of crops and we manure once in four years. We usually get large yields, and I believe that it is principally due to the fact that we use good seed and that we cultivate the land properly before we put in the crops. We never sow a single plot until we have the land in a good state of cultivation. I believe that the lack of the thorough cultivation of the soil is one of the great weaknesses in the farming of Ontario at the present time.

We now have another year's experience with our experimental work in agriculture in which almost 5,000 farmers took part and at an average cost to the Union of about 36 cents for each experiment, or a total cost of less than $1,800 for all this work. These experiments were conducted on farms throughout Ontario, thus forming centres for observation, giving not only the men on their own farms object lessons but also affording others an opportunity of seeing these experiments. When we realize that this work was brought in touch not only with the four or five thousand farmers who conducted them, but also with thousands and thousands of others who saw these experiments, we comprehend something of the increasing influence and of the great importance of this co-operative work in the Province of Ontario. We are encouraged to go ahead and even increase this great work, realizing as we do that it is accomplishing much for the betterment of our agriculture.

Farm crops in Ontario amount to about $150,000,000 annually. The crops we were talking about yesterday afternoon have an estimated value of $100,000,000 every year. We are, therefore, dealing with a matter of no small significance. There are great responsibilities not only on those directing the work, but also on all the experimenters throughout Ontario. I wish in this public way to thank these 4,856 Ontario farmers who conducted the work upon their own farms during the past year, and who have furnished us with these results, which I hope will be of value not only to themselves but to the other farmers throughout Ontario. (Applause.)

RESULTS OF CO-OPERATIVE EXPERIMENTS WITH FERTILIZERS ON SWAMP SOILS.

By W. P. Gamble, Professor of Soil Chemistry, Agricultural College, Guelph.

Owing to the shortness of time at my disposal, it is impossible to discuss any results of fertilizer work of previous years, and I will have time simply to deal briefly with the results secured this year.

Co-operative experiments were conducted in 1909 with corn, oats, potatoes, rape, millet, and mangels. The plan of experiment was as follows: Land as uniform as possible was selected, and in the case of corn and potatoes, six plots 1-40 of an acre were accurately measured and treated as follows:—

No. 1. Unfertilized.
No. 2. Complete fertilizer.
No. 3. Nitrate of soda and muriate of potash.
No. 4. Superphosphate and potash.
No. 5. Nitrate of soda and superphosphate.
No. 6. Barnyard manure.

whereas, with oats, rape, millet and mangels, a series of seven plots 1-40 of an acre were used, the plan in this case being as follows:—

No. 1. Unfertilized.
No. 2. Complete fertilizer.
No. 3. Nitrate of soda and muriate of potash.
No. 4. Superphosphate and muriate of potash.
No. 5. Nitrate of soda and superphosphate.
No. 6. Muriate of potash.
No. 7. Barnyard manure.

TABLE I.—EXPERIMENTS WITH CORN AND POTATOES.

Plot.	Fertilizer used.	Lbs. per acre.	Yield of Corn—Bushels per acre.				Yield of potatoes
			I.	II.	III.	Average.	Bush. per acre.
1	No fertilizer..........	....	32.9	28.5	12.8	24.7	96.0
2	Superphosphate..... Muriate of Potash.... Nitrate of Soda.....	500 160 150	49.5	58 7	36.5	48.2	184.6
3	Muriate of Potash.... Nitrate of Soda.....	160 150	46.2	45.5	21.6	37.6	164.0
4	Superphosphate...... Muriate of Potash ...	500 160	46.1	25.9	26.4	32.8	92.6
5	Superphosphate . ... Nitrate of Soda......	500 150	52.0	44.4	25.5	40.3	124.0
6	Barnyard manure	20 tons	48.1	39.3	28.4	38.6	184.0

NOTE.—Amounts of Sodium Nitrate reduced to 100 lbs. per acre, and Muriate of Potash raised to 200 lbs.

Let us first examine the results obtained from the corn experiments. It will be seen that three separate experiments were conducted, and in every case except one, the yield obtained by the use of fertilizers greatly exceeded the yield from the unfertilized plots. It will be further observed that the complete fertilizer practically doubled the yield over that obtained from the unfertilized plot. This experiment clearly illustrates the characteristic of the corn crop, namely, the necessity of the plant's food being, first, in a soluble condition, and, secondly, present in large quantities. It also illustrates the marked results of soluble nitrogenous fertilizers on the corn crop. Barnyard manure also gave a very marked increase over the unfertilized plot, and emphasizes the importance of heavy and liberal manuring for this crop.

It may be a matter of interest to some to note the great variation between the yields obtained in the three experiments, all having received the same amounts of fertilizers. This variation was due to the difference in the soils themselves. Experiment No. 1 was conducted on a fairly heavy clay loam in good mechanical condition. The previous crop was oats. Experiment No. 2 was conducted on a good average loam and the previous crop was barley. Experiment No. 3 was also a loam, which had been cropped heavily for a number of years, so that it was pretty well depleted of its humus. This accounts for the smallness of yield on the unfertilized plot in Experiment No. 3, the yield being only 12.8 bushels per acre, as compared with 28.5 bushels in Experiment No. 2, and 32.9 bushels in Experiment No. 1. Further, the necessity of an abundance of humus in the soil is also clearly shown. While none of the yields obtained were maximum ones in either the unfertilized or fertilized plots, nevertheless, the increases gained are sufficient to clearly illustrate the benefit to be had from application of artificial fertilizers on corn.

EXPERIMENTS WITH VEGETABLES.

Onions, cabbages, and tomatoes were all experimented upon with very marked results. It will be found that in the case of both onions and cabbages a ready response was got from the application of soluble nitrogenous fertilizers, particularly in the case of the cabbage crop. Cabbage being a leaf crop, and nitrogen being the constituent that stimulates leaf and stem growth more than all others, this is readily explained. In fertilizing cabbages with nitrate of soda, it should be applied in three applications, rather than all at once, owing to the soluble nature of the material. It must be remembered also that it is most needed in earliest stages of growth, particularly so in cold and backward seasons.

With tomatoes, the best results were obtained from the application of a complete fertilizer. In this case, the addition of potash and phosphoric acid helps in the formation of the fruit, while the nitrogen helps to produce a strong, thrifty plant with good leaf and stem development.

In the case of onions, fresh stable manure is to be avoided on account of weed seeds, and also because it favors the growth of the onion maggot. Stable manure is preferably used on soil two years before planting onions. An *excess* of nitrogen delays the ripening and injures the keeping quality of onions.

EXPERIMENTS WITH OATS, RAPE, MILLET, AND MANGELS.

In connection with the experiment conducted on oats, it might be said that the yields given are for the total crop (grain and straw). The complete fertilizer gave a very marked increase of two tons per acre. In every other experiment also, it will be seen that the yield was very materially increased.

TABLE II.—EXPERIMENTS WITH OATS, RAPE, MILLET AND MANGELS.

Plot.	Fertilizer used.	Lbs. per acre.	Oats tons per acre.	Rape tons per acre.	Millet tons per acre.	Mangels tons per acre.
1	No fertilizer..................	....	1.1	4.4	2.8	4.0
2	Superphosphate .... Muriate of potash............ Nitrate of soda...............	500 160 160	3.1	11 8	7.6	13.5
3	Muriate of potash............ Nitrate of soda....	160 160	2.3	5.2	3.2	12.0
4	Superphosphate....... ...... Muriate of potash............	500 160	2.8	9.6	6.1	13.2
5	Superphosphate.............. Nitrate of soda..............	500 160	2.6	9.4	4.0	9.3
6	Muriate of potash.........	160	2.2	8.6	4.1	11.1
7	Barnyard manure	20 tons.	2.3	11.2	6.1	12.2

A large increase in the rape crop was obtained from the application of a complete fertilizer also—the increase being 7.4 tons per acre. Barnyard manure also gave a big increase of 6.8 tons per acre over the unfertilized crop.

Millet responded readily to an application of a complete fertilizer, giving an increase of 4.8 tons per acre over the unfertilized plot. Other fertilizers also all gave a more or less marked increase.

In the case of mangels, the complete fertilizer increased the yield 9.5 tons per acre. Barnyard manure increased the yield 8.2 tons per acre.

These crops, oats, rape, millet and mangels, were grown on typical muck soils and it will be seen from the results that potash and phosphoric acid are the constituents that contributed most to the increased yields.

PREFERENCE SHOWN BY PLANTS FOR DIFFERENT FORMS OF FOOD.

It is a fact of great interest and importance that one form of fertilizing constituent is preferred by some plants to the same constituent in another form. This preference is indicated by greater yield, or by better quality, or by both; thus, wheat seems to give better results when nitrogen is applied in the form of nitrate of soda than in any other form. Spinach has been found to do better with sulphate of ammonia than with nitrate of soda, while the reverse is true of asparagus. The quality of tobacco is injured by potash in the form of muriate, and hence only sulphate should be used for fertilizing purposes. The quality of sugar beets and potatoes appears to be better when sulphate of potash is used. Hence, while the soil may contain certain quantities of fertilizer naturally, it would pay to give serious attention to the so-called chemical fertilizers, and to their nature and source.

USE OF FERTILIZERS.

There is no way to tell without experiment what food constituent a soil lacks. The crops themselves give valuable suggestions. As a rule, lack of nitrogen is indicated when plants are pale green in color, or when there is a small growth of leaf or stalk, other conditions being favorable. A bright deep green color with vigorous growth of leaf or stalk is, in the case of most crops, the sign that nitrogen is not lacking, but does not necessarily indicate that more nitrogen could not be used to advantage. An excessive growth of leaf or stalk accompanied by imperfect flower and fruit development indicates too much nitrogen for the potash and phosphoric acid present.

When such crops as corn, cabbage, potatoes and so forth, have a luxuriant healthful growth, an abundance of potash in the soil is indicated, also, when fleshy fruits of fine texture and flavor can be grown. On the contrary, when these plants fail of luxuriant growth, or are very low grade in quality, it is a certain indication that potash is lacking. When a soil produces good, early maturing crops of grain, with plump and heavy kernels, phosphoric acid will not generally be found deficient in the soil.

In order, therefore, to ascertain with greater certainty what food constituents are lacking in any particular soil, the surest, in fact the only way, is for each farmer to conduct experiments on his own soil and crops. Apply fertilizers as indicated in the preceding tables. The results can then be studied and the yield of crop ascertained. In carrying on such experiments, several difficulties may be met. The season may frequently be such as to interfere seriously with the favorable action of the fertilizers applied. Thus, severe drought may counteract all other conditions and prevent a satisfactory yield. The difference in the mechanical condition of the soil of the same farm, or even of the same field, may prevent a fair comparison of the action of the different kinds of fertilizing materials. A late, wet spring may also interfere. But, notwithstanding these difficulties, valuable suggestions will be obtained from an experimental study of one soil through the behavior of the crop.

SUGGESTIONS REGARDING THE PURCHASE OF FERTILIZERS.

It will generally be found more economical to purchase separate fertilizer ingredients, rather than mixtures. In applying fertilizers, bulk is often desirable, but in purchasing commercial fertilizers the object should be to secure as much nitrogen, potash, and phosphoric acid in available forms as possible for one dollar, instead of as many pounds as possible of fertilizer regardless of the amount of plant-food contained in it. This is particularly applicable to mixed fertilizers. Since there is smaller bulk to handle in mixing, a smaller number of packages for holding, and consequently less weight and freight, it is, as a rule, more economical to purchase fertilizers in their more concentrated forms.

Q.—Have you tested the value of acid phosphate applied with manure?

A.—No, we have not.

Q.—Would it pay to use acid phosphate on manure?

A.—I should think it would be beneficial because it is of an acid nature, and there would be no danger of the material attacking the ammonia.

Q.—Do you think the two used together would give better results than separately?

A.—I think very possibly they might. In fact from the results here recorded and from general experience, I believe I am safe in saying that the combined fertilizer seems to give better results than when one only is used. In fact in a number of cases, the use of potash and superphosphate and nitrate of soda will give better results than any single material.

MR. HAMER: This year we were able to use some land that we used last year, so that we can compare fertilizers of previous years and fertilizers of this year.

We have some interesting figures this year, and we have also had the good fortune to have everything come out as we would expect it, which is contrary to the usual experience. In our potash alone, it gave us an increase of $4.80 and the cost of fertilizer was $2.10, making a profit of $2.70 on potash alone for one year. That was just one of the results we got. We had similar results in potash and superphosphate, but I have not the complete figures with me.

PROF. ZAVITZ: I see in the audience Mr. Emslie, who is interested in fertilizer work, and I am sure we would be very glad to hear from him. We all want to work together for the interest of the agriculture of Ontario. Mr. Emslie has been doing good work in Ontario.

MR. EMSLIE: I do not know that I have very much to add to what Prof. Zavitz and Prof. Harcourt and Prof. Gamble have already said about these experiments. One thing I would like to refer to is that we may apply potash to a soil which would be deficient in one of the other ingredients, and we would not get the maximum result. In that table of Prof. Gamble's, in comparing plots 2 and 3, we see the effect of leaving out the potash. In plot 3 the potash was left out and the yield dropped. Then in plot 4, comparing it with plot 2, we find the effect of leaving out the nitrate of soda. This illustrates the fact that the complete fertilizer must be used to produce the maximum results. If superphosphate were lacking in one soil and we applied muriate of potash, we could not get the maximum results in that soil.

PROF. GAMBLE: Certain soils are poor because of their mechanical condition and not because of their composition. Therefore, a fertilizer applied to the soil in a poor mechanical condition, would not give as good results as might be obtained from the application of the same fertilizer on the soil in better condition mechanically, even though the soils might be of the same relative fertility.

REPORT ON CO-OPERATIVE FORESTRY.

BY E. J. ZAVITZ, PROFESSOR OF FORESTRY, AGRICULTURAL COLLEGE, GUELPH.

Since our meeting last year some important changes have taken place in the Forestry Department of the College. As was intimated in last year's report, the Government has started a Forest Station in the sand lands of Norfolk County. At present we have 1,000 acres which is being placed under forest management. As the details of this work will appear in another report, I will briefly call your attention to the general development as related to the work of this Union.

The creation of Forest Stations in older Ontario was a plank in the platform of the Forestry Committee of this Union several years ago, and it will be gratifying to those connected with the movement then to know that their efforts were not in vain.

The Forest Station in Norfolk County contains at present 1,000 acres of land unfit for agriculture but capable of producing good forest growth. There is, adjoining this area, at least 3,000 acres of similar land which should eventually be placed under forest management. This area contains about 40 per cent. of cleared land and probably less than this will actually require re-planting. The remaining 60 per cent. is covered with second growth which simply needs protection. The policy to be followed in managing these lands is to protect present young growth and gradually re-stock the cleared fields on which there is no chance for new growth.

The forest nurseries at Guelph have been moved to the Norfolk Forest Station and will be run in conjunction with the waste land problem.

This last season, the department sent out about 380,000 plants to applicants throughout the Province. We had expected a larger demand, but a number of the applicants were unable to handle the work, owing to the extremely wet season last spring. Our surplus material was used on the land at the Norfolk Station and here was planted about 40,000 Black Locust and Scotch Pine.

In regard to the condition of these plantations throughout the Province, I can report that the results are very favorable, many of the plantations containing from 80 to 90 per cent. of thrifty living trees. Last week I saw a plantation made two years ago at Rondeau Park, in Kent County, which surprised me. This plantation was made on Government land, and as an experiment no cultivation or preparation of the soil was given. The soil was sandy and covered with a light growth of grass and weeds. Usually the method is to make the planting lines with a plow by throwing a wide, shallow furrow in which the trees are planted. This furrow and the land thrown out protects from grass and weeds long enough for the young trees to get a start. Instead of preparing the soil as above the trees were planted in the sod. About 75 per cent. of the trees are living, and promise to survive. This sandy soil has the water-table close to the surface, and so is very moist, which probably explains the success of the experiment.

Many who receive our plants think they are too small, but this is one of the secrets of successful planting. Two years ago, Mr. Percy Reid, reported on his plantation made the previous spring. I examined his plantation a few days ago and found about 85 per cent. of the trees living. He told me that they were disappointed in the growth of the trees during the first two years, but this last season many of the White Pine had grown 18 inches. The plants take two or three years to become established, and then White Pine on average soil should grow from 18 inches to 30 inches per year in height.

I wish to call your attention to a picture on the wall showing a White Pine plantation made in Durham County on sand land in the spring of 1905. This photo represents the trees just after planting in 1905. To-day they are from 2 feet to 3 feet high. The educational value of these plantations is beginning to be felt. A number of men who are interested in the question of re-foresting the sand lands of Durham County have gone to see this small forest which only contains about eight acres, but which has proven the possibility of doing such planting. These men were skeptical about the work, but this one example has converted them.

It is hoped that these plantations scattered over the Province will influence others to re-forest the waste portions of their farms, and so assist in the maintenance of a proper proportion of woodland throughout the agricultural portions of Ontario.

REPORT OF CO-OPERATIVE EXPERIMENTS IN THE GROWING OF ONION SEED IN ONTARIO.

By A. McMeans, Agricultural College, Guelph.

The first thing that strikes one on reading this item on the programme is that it is a rather odd subject to experiment with, and I presume it is up to me to explain why it is on the programme. Last season, it was my privilege to make an investigation of the onion industry, not only in the Province of Ontario, but in some of the onion producing States to the south of us.

This work was done for the Ontario Department of Agriculture, at the request of the Vegetable Growers' Association, and in making the investigation, I also touched on the seed question. In looking up full information on that point, I found that onion seed was handled by the American Seed Trade Association to the extent of upwards of one million pounds of seed annually. About 70 per cent. of this seed is grown in California, the balance, with the exception of the Bermuda and Italian varieties, in the States of Connecticut, Pennsylvania, Ohio, Michigan, and a little in Oregon. In my investigation through Michigan and Ohio, I found several men who were growing onion seed extensively, and the thought remained with me, "Why not make an effort to produce onion seed in Ontario?" Onion seed generally sells for $1 a pound, and the crop would amount to a comfortable sum of money if we could produce it in the Province of Ontario. With that idea in mind, I selected very carefully, onion bulbs that were grown at the College, and they were sent to ten other places in Ontario, extending from the county of Huron on the west, as far east as Prince Edward County. While it is a little early to give complete results of what was produced, and I may say the season was very unfavorable all over Ontario, still we have complete reports from six of the experiments sent out.

Seed growers look at and size up the yield of onion seed in three ways: first, the yield per acre, second, the yield of seed per bushel of bulbs planted, and third, the number of seed heads it takes to produce an ounce of seed. As this experiment is in its infancy, it was thought advisable to prepare a table enumerating not only the points mentioned above, but other points of perhaps minor but important detail.

Where Grown.	Number of Bulbs Planted.	Weight of Bulbs Planted. (Pounds).	Length of Row Planted. (Feet)	Date of			Number of SeedHeads Harvested.
				Planting.	First Bloom.	First Harvest.	
Leamington	109	30	50	May 15...	July 4....	Aug. 30...	98
Guelph	102	25	60	" 17...	Aug. 14...	Sept. 21..	210
Clarkson	100	25	50	" 14...	July 20...	Sept. 1...	148
Humber Bay....	114	28⅛	60	" 13...	June 29...	Aug. 28 ..	160
Simcoe	120	30	120	" 7...	July 20...	Sept. 4 ...	345
Scotland	134	35	64	" 5 ..	July 20...	Aug. 25...	327

Where Grown.	Weight of seed harvested. (Ounces).	Rate of seed production per acre. (Pounds).	Ounces of seed per bushel of bulbs planted.	Number of heads to produce an ounce of seed.	Weather conditions.		Soil and Remarks.
					1st half.	2nd half.	
Leamington.....	5	90	8⅓	19.6	Cool and moist.	Dry ...	Sandy loam.
Guelph	13⅝	206	27¼	15.41	Too wet.	Very dry	Clay loam needs drainage.
Clarkson	12	216	24	12.33	Very poor.	Very dry	Sandy loam, exposed to wind, lots of seed heads broken,
Humber Bay....	16½	250	29⅓	9.69	Very wet.	Very dry	Clay loam, facing north-east.
Simcoe.........	40	300	66⅔	8.62	Wet and cold.	Very dry	Sandy loam, clay subsoil.
Scotland........	24	340	34²⁄₇	13.62	Too wet.	Very dry	Heavy sand loam, southern exposure.

It is the intention to test out samples of the above mentioned seed at different places throughout Ontario to see if it is possible to find out what part of this Province can grow the best seed, and to also see if any change takes place by having the seed grown in one district and the crop from that seed grown in another. To give you an instance of what I mean, I will tell you what I gleaned from a California seed grower from a conversation I had with him this fall. He informed me that although California produced 70 per cent. of the onion seed sold in America, yet it was necessary for them to import onion seed from the New England States every year to produce the bulbs, which, when planted, gives them their crop of seed. If they planted their own grown seed to produce the bulbs for their seed crop, the onions from that seed crop would be much lighter in color and later in maturity.

This is the first year with this experiment, and we are only beginning the growing of onion seed in Ontario.

REPORT OF SCHOOL CHILDREN'S HOME GARDEN PLOTS, AND OF EXPERIMENTAL SCHOOL PLOTS IN ELEMENTARY AGRICULTURE, FORESTRY AND HORTICULTURE.

By Prof. S.B. McCready, Director, and Prof. H. L. Hutt, Secretary.

This is the first annual report of the Schools' Division of the Ontario Agricultural and Experimental Union. At last year's meeting, the executive was authorized to proceed with the organization. This resulted in the appointment of a special so-called Schools Committee, composed of Prof. McCready, Director; Prof. Hutt, Secretary; Profs. C. A. Zavitz, E. J. Zavitz and Mr. E. A. Howes, representatives on Agriculture, Forestry and School Gardening respectively.

The general aim of the division was to adapt the Union work to suit the capacities of school children, and to organize it in such a way that teachers would be encouraged to direct the children in it, and to use the many experiences arising in the practical work as a means of education in the school.

In some respects it was not a new proposition. The work of the Union had always been open to the schools, and in a few cases had been undertaken. O.A.C. Bulletin 142, entitled "Gardening for Schools," and published in 1906, was largely concerned in showing how to adapt the Union work to the use of the schools. In 1907 and 1908, Prof. Hutt, through the Horticultural Division, sent out schools' experiments in growing and comparing varieties of vegetables. The new plans aimed to bring the work directly *to the schools* and make it distinctly *for the schools.* It was to be a reaching out after the child *through* the teacher. Without the teacher, the child was not planned for. Its chief aim was not to grow better vegetables or better grain, but to grow better *children;* and to do this by getting the teacher just to change her teaching matter and method a little.

The work was divided into two somewhat distinct sections. In one, known as the Children's Gardening Section, the Union offered to sell one cent seed packets to children for their own plots at home or in a school garden. In the other, known as the Schools' Experiments Section, teachers were offered seed free for four observation plots to be planted either in the school ground or in adjoining fields; these included a plot in Agriculture to show the seven different species of wheat, a plot in Forestry to show different maples, a plot in Horticulture to show the different kinds of onions, and a plot in Floriculture to show the different kinds of nasturtium.

For a commencement, only the best teachers were wanted to co-operate, and the names of these were secured through the Inspectors. In response to our offer, applications were received from 116 schools for work in the Children's Gardening and from 22 schools for the Schools' Experiments. In all, about 150 teachers took part in the work, as several of the schools participating were graded schools.

CHILDREN'S GARDENING SECTION.

In order to make the work uniform throughout the Province and easy for teachers to handle, a definite allotment of seeds was made for each grade in public school work.

For another year some changes will be made in this selection, but this year we were restricted to such seed as could be the easiest procured.

The following was the selection:—

Class.	Flowers.	Vegetables.
Junior 1st	Nasturtium	Lettuce.
Senior 1st	Sweet Peas	Radish
Junior 2nd	Calendula	Beets.
Senior 2nd	Corn Flower	Spinach.
Junior 3rd	Petunia	Bush Beans.
Senior 3rd	China Pinks	Carrots.
Junior 4th	Verbena	Onions.
Senior 4th	Asters	Sweet Corn.

The seed packets were sent to the children in a larger envelope in which was a little booklet of instructions for the work. To the teacher a sheet of instructions was sent, suggesting plans for conducting the scheme and outlining many Nature Study lessons that could be based on the children's practical experiences.

A form on which to report the work in the fall was also enclosed for the teacher. From our standpoint, this was a necessary condition for going to the expense and trouble of sending out the material. Fifty-six schools only out of the 117 have reported so far—about 48 per cent. This is considered quite satisfactory, however, in view of the facts that many teachers change their schools at midsummer, and that many cases of failure or neglect are never heard of in this cooperative Union work.

More than 12,000 seed packets were sent out. As the distribution was limited to one packet of vegetable seed and one packet of flower seed to each child, this means that about six thousand school children received seed. Compared with the total number of public and separate school children in the Province (about 500,000) this is a small number. But it was considered a very good commencement for the work.

Most of the 117 schools were in the country, but town and city schools are included in the number. These schools were quite well distributed throughout the Province, as the following list will show. The numbers in brackets show the number of schools from which reports have been received.

Counties:—		
Brant	1	(1)
Bruce	2	(1)
Carleton	3	(0)
Durham	2	(1)
Essex	3	(1)
Hastings	2	(2)
Lambton	2	(2)
Lanark	1	(1)
Norfolk	1	(0)
Oxford	1	(1)
Perth	2	(2)
Peterborough	1	(1)
Prescott and Russell	1	(1)
Prince Edward	3	(2)

Counties:—		
Renfrew	1	(1)
Simcoe—East	36	(9)
South	6	(3)
North	34	(17)
Waterloo	1	(1)
Wellington—South	2	(1)
North	4	(3)
Wentworth	3	(1)
York	1	(1)
Cities:—		
Kingston	2	(1)
Hamilton	1	(1)
Guelph	1	(1)

It will be noticed that in the county of Simcoe alone there were 76 schools participating, including town schools in Collingwood, Orillia, Midland, and Penetanguishene. This large number was due to the active encouragement that came from the Inspectors as soon as announcement of the work was made. It was fortunate for us that other counties did not undertake it so generally. We should have been completely swamped.

The reports on this work were very encouraging. There is no failure reported, although two teachers report "not successful." With all the rest the verdict is "successful," "very satisfactory," "beneficial," "quite successful," "highly successful," "encouragingly successful," "very successful," etc. Many interesting things are told about the pleasure the children had in it, the fine bouquets brought to school or sent to the sick, the successful fall fairs that were held, the splendid opportunities it afforded for good lessons in Nature Study, Art and Composition, the good effect of the work on the school discipline, the bringing of the school and home interests into closeness, and the plans and ambitions for future work.

One of the most interesting reports is that from an Indian school on the Cape Croker Reserve, Bruce County.

Schools' Experiments Section.

In the Schools' Experiments Section of the work, twenty-two schools made application for material and were supplied.

Instruction sheets, giving directions for conducting the work and outlining a course of instruction in Elementary Agriculture through lessons based on the pupils' practical work, were sent out with the seeds.

Reports have been received from six schools. In every case reported, the experiment was considered satisfactory, but evidently there is more difficulty in conducting this branch of the work than the Children's Gardening. The experiments, however, open up more problems or lines of observation than the other work, and it is hoped that this side will grow as teachers become more used to the work and secure better school grounds. From year to year the experiments will be varied so that many phases of agricultural and horticultural work may be covered during the school years of a child. For 1910, however, the experiments for 1909 will be repeated.

On the whole, it would seem that the scheme is commending itself to our teachers, and in many cases to the parents and trustees as well. It furnishes the teacher a ready means of making a commencement, and brings with it too the encouragement that is aroused in working with others in a common cause and in similar ways. Nearly all the teachers who have sent in reports ask to be notified of next year's plans, and signify an intention of continuing the work. Several intend to try the work in plots in the school grounds, thinking that they can control it better and get better results through the competition that will naturally arise.

In discussing its effects on the children, several note the improvement in the school spirit and discipline.

Plans for the Future.

The work will be continued next year with a few changes. There will still be a charge made for the seeds. Instruction sheets outlining plans for teaching the subject will be sent to the teachers and reports on the work requested (it is hoped to raise the percentage of teachers reporting). The children also will receive printed instructions for the practical work. Some changes will likely be made in the manner of ordering and distributing the seed packets. Some additional material will be offered. A special collection of tulips will be offered at a comparatively small cost for planting next fall in a formal bed in the school grounds (this will not be for private individuals). A collection of tree seeds will also be offered to encourage tree growing about the schools. And for those schools which wish to use vines for decorating the school walls or hiding outbuildings, a special collection of vines will be offered. In all cases a fair charge will be made for the material.

Teachers, who wish to be informed of particulars of next year's work, should address the Director soon after New Year.

PROF. HUTT: I think this is probably one of the most important lines of work that the Union has taken up for some time. The idea is not in growing better crops but in growing better children, and through them making better farmers and indirectly better crops.

Probably you all know there has been many attempts made in this Province to introduce Agriculture into the schools, and they have been more or less a failure I believe this method will be the most likely one to reach the goal which has been aimed at for some time, and will get the young people in the rural districts in touch with farm work. By working with them on their own home plots and taking the work right to them, I believe this work is going to grow and make itself felt throughout the Province. I have put considerable thought upon this matter, and it has been carefully worked out, and we think good will come of it.

AN ACT RESPECTING COMMERCIAL FEEDING STUFFS.

BY PROF. R. HARCOURT, CHAIRMAN OF COMMITTEE, GUELPH.

Your Committee on "Legislative Control of Feeds" desire to report that during the last session of the Dominion Parliament an Act known as "An Act Respecting Commercial Feeding Stuffs" was passed, and that this Act becomes operative on the first day of January, 1910.

The need for such an Act has been felt for some years. This is because an ever increasing number of comparatively new and untried feeding stuffs, principally mill by-products, have been offered for sale. Most of these are valuable additions to our list of cattle feeds, and are the residues from the manufacture of some specific product from the crops of the farm. They contain all the food constituents commonly found in fodders, roots, grains, etc., but in different proportions. Most of these by-products, including cotton-seed meal, linseed meal, dried brewers' grains, gluten meal, gluten feed, and the various kinds of bran, middlings, etc., are very much richer in protein than the original seeds or grains, because the substance extracted from them consists of fat, in the case of the first two, and of starch or of products rich in starch, in the case of the others, thus proportionately increasing the protein in the residues. For this reason, all of these by-products have been found to serve an excellent purpose in building up rations; they are generally palatable and healthful, and, if judiciously used, do not contribute any undesirable qualities to the products, beef or milk; besides, they possess the further advantage in that, in many cases, the cost of the ration is reduced by their use. Their intelligent purchase and economical use, however, require that the purchaser shall possess a definite knowledge of their composition.

Then, too, there are in the market mill by-products, such as oat hulls, oat dust, corn bran, pea bran, etc., which are comparatively low in protein. These feeds cannot be used to build up the protein side of a ration, and some of them are dear at any price. Furthermore, mixtures of various by-products are offered for sale under a trade name that gives no clue to their probable value. There is also a tendency to mix low-grade by-products with those the farmer is familiar with, as, for example, oat hulls with wheat bran. With this condition of affairs, it is evident that the purchaser cannot form a correct idea of the probable composition or value of feeds from the name they bear, and, naturally, there has been a growing desire that something be done to place the marketing of these materials on a more practical basis.

To the Experimental Union belongs the honor of first drawing the attention of the Government to the need of some legislative control of the sale of the mill by-product, by passing the following resolution at the annual meeting in 1903: "That the Experimental Union memorialize the Dominion Government to enact a law that the manufacturers of all by-products used as feeding stuffs for live stock, such as bran, oil cake, gluten meal, etc., be compelled to place upon the package the analysis of the same, showing the protein, carbohydrates, and ether extract the food contains, and that the same be guaranteed." The petition was forwarded in due course and acknowledged by the Department, but no further action resulted. During 1904, attention having been thus called to the subject, the members of the Union spent considerable thought and observation upon it, and were so fully convinced that their previous stand was a correct one, that at the annual meeting the matter was again brought up and the same action taken as in 1903. As a result of this petition, the Minister of Inland Revenue called a meeting at Ottawa on June 6th, 1905, at which there were present the Deputy Minister of Inland Revenue, Mr. W. J. Gerald; Mr. F. T. Shutt, Chief Chemist, Dominion Experimental Farm, Ottawa; the late Mr. Thomas Macfarlane, then Chief Chemist of the Department of Inland Revenue; and Mr. W. P. Gamble, Assistant Chemist, Ontario Agricultural College. This committee, after full consideration of the subject, came to the conclusion: (1) that it was impracticable to fix standards; (2) that extensive collections of these feeding stuffs should be made, the samples analysed, and the results published in bulletin form.

These conclusions, which eventually took the form of recommendations, were presented at the annual meeting of the Union in December, 1905, and adopted. The published analyses of the samples collected confirmed the results obtained in our laboratory and previously published in Bulletin No. 138, namely, that the feeding stuffs varied greatly in quality, and that many of the brans were largely adulterated, and that their feeding value bore no relation whatever to their prices. At the annual meeting in 1906 these analyses and conclusions were presented, and a resolution was passed which advised as follows:

(1) That each package of commercial feed stuff should be labelled with the percentage of protein and fat contained therein;

(2) That the term bran should be legally defined;

(3) That copies of the resolution should be sent to Farmers' Institute meetings to be signed by the members, and that, when signed, they be forwarded to the Minister of Inland Revenue and construed as a petition asking for the labelling of packages and the definition of the term bran.

These petitions, which were largely signed, were in due course transmitted to the Department of Inland Revenue. As no action was taken by the Government, the following resolution was passed at the meeting of the Union in 1907:

"1. That this meeting approve of the action taken at last year's annual meeting, and that we again urge upon the Honorable the Minister of Inland Revenue the desirability of a law enacted on the lines of last year's resolution.

"2. That if necessary a delegation be sent to Ottawa to urge upon the Government the necessity of Legislative control."

Acting on the above instructions, your committee arranged that a delegation composed of farmers, manufacturers of mill by-products, and Experimental Station workers lay the matter before the Ministers of Agriculture and Inland Revenue. This was done in March, 1909, with the result that the Commercial Feeding Stuffs Act was prepared and passed by the Senate and House of Commons and comes into force the first day of January, 1910.

This Act provides that no commercial feeding stuff can be legally offered for sale in the Dominion of Canada until it is registered with the Inland Revenue Department. It is then given a registration number, which, together with the guaranteed per cent. of protein, fat and fibre, must be affixed by the manufacturer, or agent, to every package of commercial feeding stuff sold or offered for sale. The statement required is as follows:

1. Name of Brand.
2. Registration Number.
3. Name and address of Manufacturer.
4. Guaranteed analysis.

This may either be printed on the sack, or a printed tag, bearing the required information may be attached to the package.

The Act defines a commercial feeding stuff as follows:

"Commercial feeding stuff," "feeding stuff," and "feed," mean any article offered for sale for the feeding of domestic animals, and feeds claimed to possess medicinal as well as nutritive properties, excepting only hay and straw, roots, the whole seeds or the mixed or unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat or flax seed; wet brewers' grains; the bran or middlings from either wheat, rye, oats, peas or buckwheat sold separately and not mixed with other substances."

It will be noticed that whole seeds or the mixed or unmixed meals made directly from certain grains are exempted, as are also bran and middlings from either wheat, rye, oats, peas or buckwheat as long as these are sold separately and not mixed with other substances. There was no desire on the part of the framers of the Act to in any way hamper trade in these commercial products. Therefore, these common, well known products that are sold in large quantities locally, were not included in the Act. It is recognized, however, that fraud has been practised in the mixing of oat hulls with wheat bran, and that meal from mixed grains may be adulterated. To check this without putting the manufacturers to the inconvenience and expense of stamping the composition on the package, it was decided to deal with the adulteration of these products under the Adulteration Act. With the object of determining a fair standard composition, the Chemist of the Inland Revenue Department collected and analysed 545 samples of bran, middlings and mixed feed or "chop." Basing his decision on these analyses, and also on those made elsewhere, the Chief Chemist will recommend what he considers should be a fair minimum percentage of protein and fat, and maximum percentage of fibre in pure products of this nature. Thus, if after all the analyses are completed, he finds that good wheat bran should contain not less than 14 per cent. of protein, 3 per cent. fat and not more than 10 per cent. of crude fibre, these figures may be accepted as a standard for bran. If then bran offered for sale be found on analysis to contain less of the first two or more of the last named constituents, it would be deemed adulterated. It is expected that the adulteration of these more common products may be controlled in this way.

The Commercial Feeding Stuffs Act ought to be decidedly beneficial in three ways:

1. It will protect the stock feeder against low grade and mixed by-products with which he is not familiar.

2. It will protect the manufacturer and dealer against dishonest competition.

3. It will promote a more intelligent use of the mill by-products, and thus directly help to bring about a more economic use of all feeding stuffs.

It is to be hoped that farmers, dairymen, and all feeders of live stock will make themselves familiar with the terms of the Act, and so study the composition and price of the feeds offered for sale that they will be able to make the best possible use of these in supplementing the home grown roughage in producing economic gain, whether for growth, or fattening, or for milk production.

HON. NELSON MONTEITH: As one of the original committee having to do with this matter, I feel we have reason to congratulate ourselves as a Union in having our efforts come to fruition at such an early date. I am glad we have so early secured in part that which we aimed at in the beginning. The amount of foodstuffs consumed in this Province is enormous.

There is one point that I think the Union might bestir itself about, and that is with regard to bringing in the tailings from the elevators at Port Arthur. These are distributed throughout the Province, and I feel that we, as guardians of the agricultural interests, should make such effort as we can possibly make to have what I consider a nuisance abated. A great many of these tailings are shipped in carload lots to the different food centres and they are poisoning the lands of Ontario.

While this is not speaking directly to the question, still it is a live issue. When our efforts have become so successful in the matter of foodstuffs, I think we might also take up with the proper authorities a request to grapple with this other evil.

MR. W. S. FRASER: I heartily endorse what Mr. Monteith has said, not only with regard to the credit that the Experimental Union is entitled to, but also with regard to the reporting and dealing with the matter of these screenings from the elevator in the west.

I had an opportunity of seeing some mixed chop obtained from a mill which was dealing with these screenings, and it contained a large number of most noxious weed seeds. This is a very important matter. These weed seeds should be eliminated from the stuff before it is sold.

Mr. Graham, of the Poultry Department, had an experience with these seeds. They sent him a quantity gratuitously, of course by way of advertising it, and I think his statement with regard to it was that if he had continued using them a week or two longer, his poultry would have died. I do not know whether the Act that Prof. Harcourt has referred to will cover the mixing of these screenings and selling them as mill feed or not.

PROF. HARCOURT: It will not cover that.

MR. W. S. FRASER: I think the Experimental Union could put forth an effort along these lines.

PROF. HARCOURT: I would like to say one word upon that point before we leave it. As I understand it, under certain conditions the millers are allowed to bring the dockage here. In some cases the dockage is removed at Fort William and leaves the elevators with a large amount of this material to dispose of.

The contention of the millers is that what the Government allows them to bring into the country, the Government ought to allow them to sell. Therefore, if they allow them to bring the weed seeds into the country, they ought to allow them to sell them. In some cases these weeds are blown into the bran, and in other cases they are ground. If they are blown into the bran, they will germinate again.

The whole matter stands with the Dominion Government to deal with; but just as quickly as we ask for an Act to prevent the selling of material from the Western Provinces, we will have all the Western members to fight, and we cannot do much in a matter of that kind without a great deal of enthusiasm and agitation.

MR. BENSON: I feel a little out of place here because I am a manufacturer. I am very much interested in the remarks of Prof. Harcourt on the subject of gluten meal, because we are the largest manufacturers of gluten meal in Canada. I think Prof. Harcourt will bear me out in the fact that we are rather in favor of an Act of this kind, because we have nothing to be afraid of in the composition of our food.

On the other hand, looking at the industry as a whole, one must be careful in fixing the proportions, because there is no use limiting the proportion of protein in a product that you cannot live up to. For instance, our gluten meal never runs below 30 per cent. We try to keep somewhere in the neighborhood of 33 per cent. We explained to Prof. Harcourt that the way the Act now reads providing for a deficiency of one per cent. of protein and fat, or an excess of two per cent. in crude fibre, would be evidence of fraudulent intent. In food that contains such a high percentage of protein, it is almost impossible to keep it within these limits.

The Act, therefore, is a hardship on us, because it was necessary, in order to be on the safe side, that we should put an analysis on our food that is really below the possible average that we can strike.

The other point I wish to make is that the Act refers to bran or middlings from oats or buckwheat, while it does not touch on corn bran. I would like to know why corn bran was left out, because any analysis that I have seen of our corn bran stands higher than the pea bran. I would like if you would allow Mr. de Coriolis, an old student of Guelph College, to speak on this matter. It was because he wanted to come to this reunion that I came here with him. He is now our superintendent.

MR. DE CORIOLIS: To follow what Mr. Benson said in this matter, I just noted when Mr. Harcourt was reading the section of the Act that corn bran is omitted from the list of the various brans that are allowed to go on the market without registration. In one of Prof. Shutt's reports for 1909, there are some analyses reported on corn bran from our factory which gives eleven per cent. of protein and eleven per cent. fibre. We notice that pea bran gives five per cent. protein and fifty-one per cent. of fibre. And if such a feed as pea bran is allowed to go on the market without registration, it seems to me that corn bran should be allowed in the same class, as it is a much superior food.

Another point I wish to speak on is the question of gluten meal. Gluten meal is one of the products that has a high percentage of protein ranging from 30 to 38 per cent. It generally has an average of about 33 to 34 per cent. It is quite beyond control in the manufacture of corn meal to prevent this variation. The corn may vary in its per cent. of protein. It may have different milling properties, the starch may not separate as easily in one case as another. These are various factors which make it impossible to control the products. Therefore, when we read the Act which says that a deficiency of one per cent. of protein or an excess of two per cent. of fibre should be considered as evidence of fraudulent intent in the total value of the foodstuff, we think that is rather hard on us. We do not know when we may be fined $50 or $100 just because our protein may have gone down one per cent.

It seems to me a much easier way of working the Act would be to have a classification of the foods, and foods with 10 to 20 per cent. of protein might be allowed a variation of one per cent., and those ranging from 20 to 30 per cent. should be allowed a variation of 2 to 3 per cent., and those containing from 30 to 40 per cent. a margin of from 3 to 4 per cent. If this were done the manufacturers would have more protection, and the variation of this kind would not show fraudulent intent, because I have pointed out to you that it is impossible to show this. We hope it will give better protection to the manufacturer, and at the same time protect the farmer, and will enable us to give the farmers a highly valuable foodstuff for their cattle.

Prof. Harcourt: I would like to refer to section two of the Act in reference to this point that has been brought up. The Act was drawn up by the Chemist of the Inland Revenue Department and with the assistance of Prof. Shutt, of the Agricultural Department. They submitted a copy to me for consideration, and I wrote asking why peas were excepted in the first section. No mention is made of the fact that pea meal may be sold either mixed or unmixed with other grains, and I also asked why corn bran has been left out of the list of brans. I did not get any answer.

I do not see any reason why corn bran should not be allowed to be sold separately as well as bran of any other grains. We found in our own analysis that pea bran varied from 7 to over 12 per cent. in protein. Corn bran is just as valuable a meal as some of the others. If a small miller offered for sale a mixture of peas with other grains, he would be working contrary to this Act, because peas are not exempted. I do not know why it was not put on.

I think possibly the point is well taken with reference to the limitations of these substances which are rich in protein. It never came up in the discussion of the matter. Possibly because we did not have much direct help from the manufacturers themselves. It was thought one per cent. of a variation was a wide enough variation, but when we come to speak of these products that run over 30 per cent. protein—and anyone who knows how protein is determined knows that a very small error in the determination will make a difference of one per cent. in the material, especially when you work on substances so rich as this—and when you take into consideration the variation in the composition of the grain and the separation of the material, possibly one per cent. is too small a variation for these higher products.

In gluten meal we have had samples which contained 35 per cent. I do not know that we have any reason to believe that these have been adulterated. In some of these richer materials, it is possible a wider range will have to be allowed.

Prof. Zavitz: It seems to me that this is a most important subject, and also the subject that is referred to by the Hon. Mr. Monteith with regard to screenings. I do not think we should pass that over, and I wish to say a little with regard to that point.

You will remember that the Experimental Union took up the question of Forestry a few years ago, and although it was a difficult matter, they kept pounding away until they were successful, and then we took up the question of foodstuffs, and after seven years' work we have obtained what we started out to secure.

Now with regard to screenings from Fort William, both Mr. Monteith and Mr Fraser believe what they say, and if they would put it in the form of a resolution to be brought before the meeting this afternoon, a committee could be appointed at the last session to take up this question and to report next year, and then they could consider whether the matter should come before the Provincial Government or the Dominion Government. Mr. Clark told me that he tried to do something in Ottawa, but they say it is not a Dominion matter, that it is a Provincial matter, and that is a question that the committee we appoint can deal with, and find out whether it should be presented to the Dominion or the Provincial Government.

I think we realize, and the farmers of Ontario realize, that there is a very great harm coming to the farmers of Ontario through weeds which are brought in, in the screenings. I think it is a matter that the Union should take up.

PROF. MCCREADY: I think something should be done here and now. We have found thousands and thousands of weed seeds from these screenings that are brought in. Undoubtedly many of the weed pests which we have received reports of from all over Ontario had their origin in these screenings, and while some of the seeds may be valuable for food purposes others are very harmful. The purple cockle seed that is in many samples is quite objectionable on account of its poisonous qualities. Ergot is also found and is objectionable. It seems to me that the Seed Control Act might govern the sale of foods as it now governs the sale of seed grains. Something might be done to make the millers kill the seeds by treating them at some high temperature. I would move that Mr. Fraser and Mr. Monteith be a committee to draft a resolution to bring before the meeting this afternoon.

MR. MONTEITH: I would move that Mr. McCready and Mr. Zavitz be added to that.

The motion was seconded by Prof. Harcourt and carried by the meeting.

IMPORTATION AND DISTRIBUTION OF NOXIOUS WEED SEEDS IN SCREENINGS.*

Your Committee, appointed to consider what method should be adopted to prevent the importation and distribution of noxious weed seeds in screenings to Ontario farmers, beg leave to recommend the following resolutions:

1. That owing to the introduction for feeding purposes of screenings containtaining noxious weed seeds and to the damage resulting from their wide distribution throughout Ontario, this Agricultural Experimental Union at its thirty-first annual meeting respectfully recommend and urge that such legislation be enacted as will remedy this evil.

2. That our former committee on legislative control of feeding stuffs be continued with power to add to their number to deal with the question.

The adoption of the report was moved by Hon. Nelson Monteith, and seconded by W. S. Fraser.

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* For fuller information on this subject the reader is referred to the discussion on the paper entitled "An Act Respecting Commercial Feeding Stuffs," immediately preceding this report.

THE CHAIRMAN: If members would like to say anything in the way of discussion, we would like to hear from them now. Probably Mr. Clark, of Ottawa, could give us some suggestions. We would like to hear from him.

MR. G. H. CLARK: The resolution which is before the meeting is timely. It is a very important matter to consider in connection with the welfare of agriculture, particularly in the Province of Ontario. The trouble has now existed for more than seven or eight years. It is, I think, seven years ago since our Federal Government amended the Manitoba Grain Inspection Act, which allowed the chief inspector of grain at Winnipeg to give a higher grade on grain than he otherwise would. He has the privilege now of grading a car of wheat as No. 2, and mark on that certificate "Clean 5 per cent. or 3 per cent.," as the case may be. That car of wheat would go to the elevators at Port Arthur and three or five per cent. would be taken out. The farmer who produced that dirty grain would have to pay three or five per cent. for the process, and the cleanings from it would go into the possession of the elevator company that did the cleaning. I know, as a matter of fact, there are hundreds of car loads yearly that are accumulations of these so-called screenings. They have a relatively high value from the standpoint of the chemist. They have to be manipulated to a considerable extent to eliminate that part of the screenings that is objectionable to the stock. Most farmers know that very many species of mustard seed are bitter and they have to be removed. They have been doing very good work at both of the elevators in separating those screenings before grinding, and I have discussed the matter very fully with the head of the British Elevator Inspectors at Port Arthur, and with Mr. King, and both agree that it is entirely practicable to so grind those screenings that they would be almost entirely free from living seeds. They point out, however, that some farmers of Ontario want it not too finely ground.

It seems to me highly important in the interests of the Province of Ontario that conditions which now exist at Port Arthur and Fort William should be stopped. But there are evils existing in many of the plants and mills of Ontario. Many of the mills grind and put on the market feeding stuffs by the car loads which contain screenings. From an analysis of about forty samples, we found practically none that were entirely free from noxious weed seeds.

Next is the question as to what body should have first duty in dealing with that evil. It is a question I have given considerable attention to. I went so far as, three years ago, to draft roughly the essence of a bill that would correct that evil, so far as the Province of Ontario is concerned. Any legislation that is enacted by the Federal Government must be equally applicable to all the Provinces. That must apply in Manitoba where the wheat seeds are produced, as well as in Ontario, and legislation such as we could give in Ottawa, that would correct that in Ontario would not be acceptable in the Western Provinces. The Provinces of Manitoba, Saskatchewan, and Alberta have enacted laws dealing with those evils which existed in the respective Provinces.

Considering the evil as it exists in Ontario, it seems to me if you were to have an evil corrected by legislation, it would be better for the Province of Ontario to deal with it as the Provinces of the West did. If this meeting sees fit to pass that resolution, asking the Federal Government to make such legislation, I am not in a position to say how they will accept that resolution. Personally, I know that the Minister of Agriculture will do his utmost to meet the wishes of the people, if it can be done.

I cannot say more, and I do not believe you could have reasonable hope to have people in all parts of Canada agree to legislation that would correct the evil as you want, and as it should be corrected.

PROF. McCREADY: I would like to emphasize the idea Mr. Clark has left with us, that while there may be no hope that anything will be done by the Government at Ottawa, there is every reason to believe that our own Provincial Legislature can handle the question. Trade within the Province is a thing that can be dealt with by our own Legislature, and they may pass an Act compelling the sellers of these seeds at Fort William and Port Arthur to either grind them or treat them in some such way that they cannot produce plants. Our committee have good reason to believe that something can be done.

PROF. ZAVITZ: The way the question stands, the committee has full liberty to take it either to Ottawa or to Toronto, or to both, if necessary. It is left entirely with the committee to look into the question and to see where it can be dealt with to the best advantage.

The resolution, on being put to the meeting, was carried unanimously.

Those forming the committee to look after this work are Professors R. Harcourt, C. A. Zavitz, and Geo. E. Day.

TEACHING AGRICULTURE IN HIGH SCHOOLS.

BY A. McKENNY, ESSEX.

In the short time at my disposal, I shall not make any attempt to go into the history of the movement, which is no doubt more or less familiar to the most of you, but shall confine my remarks to the work which has been accomplished and the present condition of the experiment. Any views which I may have to offer have been derived from my experience in endeavouring to work out the plans of the Department for teaching Agriculture in the Essex High School. And while they may be true under the conditions which exist in Essex County, they might not apply to other sections of the Province.

When entering upon my duties, it was understood that the important feature of the work was to organize a class of boys, who would take the prescribed course in Agriculture.

This course was planned to extend over a period of two years, the work of these two years was supposed to be equal to one year's work at the Ontario Agricultural College. It was hoped that this course would appeal to boys from the farm, who were attending the High School and who would probably return to the farm or who were planning to attend the Ontario Agricultural College later.

Theoretically, this course looked fine. It was outlined to fit conditions in the county surrounding the High School. The principal of the school, the members of the High School Board and others identified in the movement were quite enthusiastic as to the value of the work prescribed, and the probable number of farmers' sons who would take advantage of it. A vigorous advertising campaign was undertaken through the branch office of the Department of Agriculture. Extension work was carried on throughout the county; judging courses, farmers' clubs, etc., were organized, and through these, the value of agricultural education was emphasized. But after two years hard work, I regret to say that our general course in agriculture has not proved the success which we had hoped for in the beginning.

Numerically, we seemed to be doing fairly well, closing last year's work with eight boys taking the work in agriculture. But of these eight, only three were farmers' sons, the remainder of the class being made up of boys from the town who were only interested in certain phases of the work. Though there were many farmers' sons in the school, nearly every boy was there for the purpose of getting away from the farm and took no interest in anything pertaining to agriculture.

This state of affairs, it seemed to me, did not fulfil the purpose intended. The question which arose was how to interest the farmers' sons in the work we were doing. The farmers themselves appeared to be very much interested as evidenced in the manner in which they had taken up different lines of work which we had inaugurated; as, for instance, the Ontario Corn Growers' Association, which was organized and is supported by the farmers themselves, and now has a membership of over 500 in the Counties of Essex and Kent.

One of the most serious drawbacks in connection with the long course work in the High School, is that it opens in the middle of September when every farmer's son is busy at home on the farm, and the only possible students we could hope to get were young boys from twelve to thirteen years of age who had just passed the entrance. This shut out dozens of young fellows from sixteen years and up who were just beginning to be interested in farm life, and who had quit school before or immediately after passing the entrance examination and were now beginning to feel the need of a better education.

Having sized up the situation, we concluded that our long course in agriculture in the High School was not reaching the boys, who were most in need of just such instruction as we were prepared to give them. We decided to draft a course which would be particularly adapted to the needs of the young farmers in Essex County. In order to make this fit in with the season in our section and with the work which we knew must be done before these boys could hope to get away, we advertised a six weeks' course in Agriculture to begin in January and end about the middle of February, in plenty of time for the spring work, which begins with us often as early as the first week in March.

Upon the day that we advertised this course to open, instead of one or two small boys, eighteen young men, ranging from sixteen to twenty-five years of age, appeared prepared to take up the work.

Many of these young fellows had been away from school for from six to eight years, and had forgotten a great deal of their elementary education, or never had gotten beyond fourth class work in the public school. But all were anxious to learn and made excellent progress.

The nature of the course was about as follows: Arithmetic with a practical bearing on farm problems, Farm Bookkeeping, Live Stock Judging, Seed Judging, Food Requirements of the Soil, Drainage, Identification of Weeds and Injurious Insects, etc. An effort was made throughout to make every subject as practical as possible.

The interest was such at the end of six weeks that the members of the class came forward unanimously asking that the course be extended for another two weeks.

Owing to the success attained in this winter course, and the evident value to the young farmers of the county, we have decided so far as our work in the High School is concerned, to concentrate all our efforts in developing this line, which for the County of Essex under the conditions which exist there seems to be the most satisfactory line to follow. The High School Board have not been slow in seeing the value of this winter course, and are spending a considerable sum of money in fitting up a class-room to accommodate the much larger attendance which is expected at this winter short course.

Speaking generally regarding the progress of the experiment in other sections, where the work has been attempted, many of the men have met with similar results in connection with the two years' course in Agriculture in the High School. Some I find have abandoned the general course and are following other lines of work. Others are working along with fairly good success and with a fair attendance.

Whether or not a general course in Agriculture will ever be an established thing, or whether it would be wiser for those anxious for such a course to attend the Ontario Agricultural College, and there get a better course in half the time for the same money, is something that time will decide.

But for a course which touches the boy, who is just beginning to farm, and who is at the age to appreciate the work, and is unable to spare the time or money for a long or short course at an Agricultural College, the High School winter course seems to be the proper thing. It is at his home, it is cheap, and it gives him exactly what he needs, as the instructor is acquainted with these conditions, and has a chance to solve the problems which he is up against.

It has proven satisfactory for Essex County, and could, I think, be tried advantageously in other sections where High School work is being undertaken.

WHAT THE FARMERS' CLUBS ARE DOING.

By F. C. Hart, Galt.

Farmers' Clubs, so called, have been in existence for thirty years or more. It is only during the last year or two, however, that they have taken on a new impetus that has given them what I believe to be a permanent place in the development of Agriculture in this Province. Looking back over one year's work of the Farmers' Clubs in Waterloo County, we can see some important results already accomplished. In the limited time at my disposal I can mention but some of these.

And the most important perhaps is the awakening of an increased respect for, and interest in the business of farming by the farmers themselves. This may seem commonplace when you hear it spoken, but if you had seen, as I have, a whole countryside change in its mental attitude from one of a sort of indifference to a vast respect for the nobility of the calling, where the discussions at Institute meetings have taken on a new significance, where a hundred rural telephones, a rural mail delivery, and one of the best small rural schools in the Province, have all been brought into existence in the space of one year, you will begin to realize something of what at least one Farmers' Club has done in this respect. Wherever there has been a live Club, there the interest in questions touching the farmer and his occupation has been greatly enlarged.

The second most important object that I can see has been accomplished by these Clubs is the creation of a community spirit, and the enlargement of the social life in the district. To my mind this is a most important factor in rural life. We are gregarious creatures all, and one of the big reasons for the young people migrating to the cities is the desire to move among more people. In the country district, the pie social, the school concert, and the barn raising, are all largely attended, not because we like to eat pies and build barns, but because of the opportunities these occasions offer of seeing and enjoying more of the characteristics of our neighbours, of learning more of humanity. They help to broaden from the 100-acre farm gauge. Where the Club and the local Women's Institute have united in holding semi-social evenings marked results other than the success of these meetings have been noticed. The working on committees, the planning of details, the running of a plowing match or a short course, have given opportunities of seeing both the good and bad qualities of neighbours, of seeing the viewpoint of others, of broadening the outlook. I have seen some splendid results of this social influence of the Club.

One of the largest reasons for the advancement of the club movement is, of course, that it is an educational factor. And the value of discussions at Club meetings is enhanced by the fact that local men, understanding local conditions, are discussing local problems. Such meetings are often of much more value than the Annual Institute Meeting. I have heard members say that it is impossible to attend any meeting of a live Club without getting something of real value. All of the educational meetings of Clubs I have attended in the County are of an informal character, with the conversational form of address, and questions always in order. The success of the Clubs in Waterloo County is due in a large measure to the fact that both old and young men are taking an active part. And I think it is a mistake to suppose that the Club is a young man's institution. The younger men may have newer ideas, but the older men have the experience, have an intimate knowledge of local conditions of soil, of varieties suited to the district, and much other information that can be gained only by experience, and these things are essential. After all, the main reason of the Club is the endeavor to raise the standard of Agriculture in that district to the highest level, and it needs the best brains and experience of the community towards that end.

An educational department of many of the Clubs has been the experiments carried on by the members. We have had over 40 experimenters in the various Clubs, with spraying potatoes, with spraying fruit trees, and with commercial fertilizers on various crops on muck soils. The results of these experiments are being discussed at the meetings, and information valuable to the community is being obtained.

As a means of organization and co-operation, the Club has proved its value. Such an organization in a community has been a great aid towards the carrying out of some of the public utilities that might otherwise be long delayed in coming. As a result of the public spirit that has been awakened, rural telephones and rural mail delivery routes have been instituted. One Club has been the means of reviving the old plowing match on modern lines. Another has united with its market town in starting a continuation class, so that rural school pupils who would otherwise be deprived of it, might have the privilege of a High School education. Any large question that touches the community as a whole has been freely discussed by these Clubs. And let me say just here that in the working out of some of these problems, the country people and the townspeople have found the advantage of working together, and a good deal of local prejudice has been broken down.

Many other results of organization through the Club might be mentioned. A marked result of the organization of one such Club was the managing of one of the best short courses held in the Province.

I cannot speak of the Farmers' Club without mentioning its importance as a means of improving public speaking among farmers, especially young farmers. I believe that the farmer's low estimate of himself, which we hear so often deplored, is largely brought about by his inability to assert himself and to "measure up" with his fellow. And the cause of this is simply that he has lacked the opportunities. The power a man feels coming to himself when he is able to stand up and impress his ideas on other men must have its effect for the betterment of the class, and be an aid towards increasing the respect for both the farmers themselves and their calling. And in this also I have seen marked results. As meeting succeeded meeting, the members who took part certainly gained in ability to adequately take part in the debate and in the discussions, and it is having an influence in increasing the value of the members, not only to the community, but to themselves. There has also been a marked improvement in the conduct of the business part of the meeting. Promptness, and the employment of proper business methods, so often lacking in a meeting of farmers, has been an excellent characteristic of the meetings.

Personally, I think that if the Club is to be a permanent organization, there are at least two things to be avoided. I refer to politics and excessive co-operation. There must of necessity always be two or more opinions as to political questions, and under our present system of party government politics will have a tendency to cleave an organization having education, and not politics, as its underlying principle. There are, and there is room for, other organizations for the political interests of the farmer.

What I mean by excessive co-operation is the clubbing together to buy some of our common supplies, such as salt, etc., that could be bought as cheaply or almost as cheaply from the local merchant. The local merchant is a necessity in any community, and we owe him a living; and by thus clubbing together to take away his profits we are depriving ourselves of the privilege of having a good local merchant. Not many local merchants are millionaires, so they cannot be making a marvellous lot out of us at any rate. It pays better to give the local merchant a little more for some few articles rather than to be penny-wise on a few hundred pounds of salt. There are many fields of legitimate co-operation open to the Club. If the local merchant cannot supply the quality of seed desired, no merchant can take offence if seed be obtained by members from the best source elsewhere. Co-operation in obtaining pure-bred stock, in conducting experiments, in limiting the varieties grown in the district, and in many other ways are all valuable lines of work open to the Club. With regard to the last mentioned, let me state that I believe one of the almost necessary evils of Ontario Agriculture to-day is the multiplicity of varieties, and that the Club might be made a very valuable factor in remedying this evil. After the experiments have demonstrated the variety suited to the district, the co-operation of the members in growing this one variety would result in much good in enhanced production and prices. We are planning to bring this scheme to a successful issue in at least one Club this coming year.

Looking into the future, it is difficult to foretell what the results of this Club movement may be. Through their agency we might in time be able to have not only specialized farming but specialized districts; instead of in many districts having some good beef cattle men and some good dairy men, *all* farmers in that locality would specialize in beef production or dairy products or fruit growing, etc., each district having its own distinctive policy; and such specialization all over the Province would be an immense step forward.

Many other benefits of these local clubs have been obtained, and the few remarks that I have addressed to you this morning are altogether inadequate to the importance of the Farmers' Club Movement in Ontario to-day.

MR. PUTMAN: While I believe that Farmers' Clubs will be most successful in those localities where we have a district representative located who will take a personal interest in the work and give directions, I see no reason why the Club movement should not be extended to other localities. At the present time we have about 130 Clubs that are doing active work, and we have enquiries from a great many sections with regard to organizing. I see no reason why ex-students and Institue officers and other leading men should not take up the matter of organizing the farmers of the various sections into Clubs for the discussion of the common-sense matters in a common sense way for the common good.

We have adapted ourselves to local conditions and a discussion of the general purposes and products of the farms of the different localities is very important, and could be made one of the most effective lines of Agricultural educational work in the Province of Ontario. I would like to hear from some of the other men who have had experience in Club work.

Mr. Angle: I agree with Mr. Hart that no Club of farmers should co-operate to under-sell the town merchants. The Norfolk Fruit Growers' Association use an immense amount of spraying material, and they went to the merchants of the town and gave them an opportunity of selling to the Association spraying material, but the prices were not satisfactory. So they bought it themselves, and saved 50 per cent. on the very best prices that the town men could give them. It seems to me that town men in that case must have asked a big price. They could have afforded to sell it much cheaper; and if the farmers could have gotten it at a reasonable price they would have given the trade to the local people. When they save 50 per cent., I believe the Farmers' Club is justified in buying it co-operatively. But I do believe in giving the town men a chance first.

THE NEED OF LOCAL DEMONSTRATION PLOTS IN ONTARIO.

By H. Sirrett, Carp.

At first thought, this might appear to be an introduction of an old subject under a new name, but upon further consideration I think it will be admitted that it is a phase which as yet has not formed a large part of the agricultural educative propaganda in Ontario.

By "Local Demonstration Plots" is meant plots located at or near local centres, upon which the value of new kinds or varieties of crops or improved methods of selection, care, or cultivation would be demonstrated; which, by previous experiments carried on under conditions similar to those prevailing in that locality, have given most satisfactory results, and which varieties or methods were not being practised in that locality.

These plots would be used to carry on work after it had passed the experimental stage, and when desirable results could be confidently expected. In this way, the results of the work carried on by the Experimental department here and by the Experimental Union throughout Ontario would be placed before the farmers in the locality where such plots were situated, in a most tangible and striking way.

In the Experimental department at the College and in the Experimental Union, Ontario has a highly developed system of testing ways and means by which the productivity of her farms might be increased. A great deal of good has been done, but the value of this work might be greatly enhanced by the adoption of a method which would bring the knowledge thus gained forcibly before those who, so far, have been little influenced by it.

If a large percentage of the farmers of Ontario made occasional trips to Guelph, and spent a day in observing the results obtained on the plots at the

College, and afterwards supplemented what they had seen by a study of the reports issued from the Experimental department, it is possible that there would be no need of doing more than is now being done to carry to them the information which should be of such benefit. Unfortunately, in spite of the large numbers who visit the College annually, and who are in constant touch with the work that is being done here, there are still, especially in those counties more distant from Guelph, a large number of farmers who are seldom visitors at any experimental station and who read but little from the reports sent them.

The outstanding advantage of such demonstration plots is the conviction they carry by presenting unmistakable evidence of the value of the methods or varieties employed. If the results obtained are superior, they will attract attention which will lead to inquiry later, as to how such results were obtained. This eye-evidence carries a conviction as to the value of the point demonstrated which is not lost if equal success is not at first obtained by the adoption of the suggestions gained from the example set them. What they have seen accomplished they cannot but believe they may accomplish themselves.

During the summer of 1908, I had the opportunity of observing the interest taken in the experimental plots conducted in connection with the Morrisburg District Branch. There, I found that it was those plots upon which were growing crops which illustrated the claims made for them in the reports of the Experimental Union which excited great interest. In reality, the plots showed nothing but what those viewing them may have learned from reading the reports sent them. Possibly they had read that just such results would be obtained; still it remained for the actual seeing of these results to create an interest in how they might similarly increase the returns from their own fields.

In counties where District Representatives were situated, some such plan could, I think, be adopted with advantage. These plots could be conducted at more points than at the school with which he was connected. The expense incurred would not be at all large, and if the grant now made by the County Council for such work at the school was available for similar work at other points throughout the county, it would be sufficient to meet all the expense necessary.

VALUE OF EXPERIMENTAL WORK IN LANARK COUNTY.

By R. S. Hamer, Perth.

While the experimental work has not been the most important feature of our work in Lanark County, we have, nevertheless, undertaken a good deal of outside work along that line, and I judge that this fact explains Mr. Zavitz's choice of a subject for me. On the plots in connection with the school, we have conducted variety tests with various farm crops during the past two years, using seed obtained through the Experimental Union and from the Central Experimental Farm. The value of this work is in the comparisons of yields. Owing to the lack of conveniences for threshing and cleaning the grain, our cereal tests have not been of great value either in arriving at an estimate of the yield per acre of any one variety, or in making comparisons between varieties. These tests have been of value nevertheless to the boys in the school in acquiring familiarity with varieties, in studying types, and in making comparisons between varieties during the growing season. In the same way they have been of value to farmers in the immediate vicinity of Perth. Needless to say, they have been of considerable value to ourselves in forming opinions regarding the suitability of varieties, etc. We also are making use of the seed obtained in this way by distributing half bushel samples of these selected varieties among the farmers.

During the past two years we have devoted considerable time to muck soil investigation work, and have under way a fairly extensive series of experiments on different types of this soil throughout the country. The building up of exhausted muck lands, the adaptability of various crops and of different varieties of the same grain crops have been the main features of this work. We have used mineral fertilizers of different kinds, and in different combinations, and have tested these in comparison with barnyard manure. In this year's work we have had an opportunity to test the influence of last year's fertilization in comparison with fresh fertilized ranges, and with some fertilized for the second time. The crops used have been Early Daubeney oats, Liberty oats, millet, rape, and roots. In connection with our oat experiment we have tested the suitability of ten different grasses and clovers for seeding down purposes on this land. Our results so far have been interesting, and some of the ideas suggested will, we hope, prove valuable when we have had a couple of years' further experimentation to confirm our deductions. This question is of great practical importance here, as there are thousands of acres of swamp land in this county which are being drained, often against the owner's wishes, by municipal and award drains. Much of this land which has been cleared is at present lying idle, while in other cases only comparatively poor crops are realized. Some of our work has indicated the value of phosphate on this land. If this result is confirmed, the deposits of rock phosphate in the immediate vicinity of Perth should prove of considerable importance to this district.

This year we have been carrying on some preliminary experimental work with corn with a view to selecting for early maturity and producing our own seed corn annually from some good dent variety. While this attempt in this latitude is contrary to the counsel of many corn authorities, we have had very encouraging results this year with two or three early varieties which we have brought in from Experimental Stations in the North-west States. We had an acre of Wisconsin No. 7 this season which matured well, and which has yielded us about sixty bushels of first-class seed. So favourably impressed were the farmers with this patch of corn that the farmer on whose place it was grown will be unable to supply all the orders for seed which have poured in on him.

A SERIES OF SHORT JUDGING COURSES.

By I. F. Metcalf, Collingwood.

In dealing with this subject I wish to have it understood that I am not pleading for others to take up this particular feature. I shall simply state what is being accomplished in Simcoe County under this system and what the end is that we are aiming at.

To begin with, we had in Simcoe County last winter Short Course Judging Classes at six points. Four of them were two day courses, and two of them were one day courses. I look on all of them as being quite successful, although the weather was not always what it might have been and the roads were practically blockaded one day, so that I have every reason to believe that the attendance would have been larger still had we had favorable weather all through. I might say that I believe the weather has more to do with the attendance at these Short Courses in a number of places than it does with the attendance at a longer course in one central place, because a number will come in to the longer courses to stay right through; but if the farmers are driving in for a day say to the town to one of these Short Courses, a blockade of the roads will most certainly make a big difference in the attendance.

Our courses proved very interesting to the farmers, and I consider that the results were good. I am so favourably impressed with the good results of last year that I intend to conduct this winter's Judging Classes under very similar plans. Our conditions in Simcoe County are rather peculiar. In the first place, the county is a very large one and is not square cut so that there are large distances to be covered. The county runs 58 miles from north to south and 52 miles from east to west, and 65 miles from the south-west corner to the north-east corner. Besides that, the county is very much broken up with sand plains and also in the northern part by rocks, so that really there are quite a number of rather distinct divisions in the county which necessitates having Short Courses in a number of local centres rather than in one district centre.

I have tried to lay before you the reasons why we have adopted the scheme of having a number of Short Courses in this district. I do not believe it is an ideal system by any means, because you no sooner get nicely started with the farmers than you are done in that place and move on to another. You only touch as it were the fringe of knowledge of the subject. There is no time to get down at all deep into it, and about all you can hope to do at the best is to get the farmers of the locality interested in that line of work. I found that in this district very few knew what a score card meant, and it seems necessary on the start to get the farmers together in their particular centres and get them interested in judging. I find that they very soon get interested and that in the places where Short Courses were held last year the farmers are very anxious to have others again this year, so much interested are they in the work. As a matter of fact, one of our most successful Short Courses was held at a place where they have not been able to hold an Institute meeting for a number of years. It is not our policy, however, to hold these courses in the same place two years in succession if accommodation can be found at any other good centre in that particular district, so that we spread the interest to other centres from year to year, and hope before long to have a good interest worked up in Short Courses throughout the whole district. Then, I believe, that it will be possible to hold fewer Short Courses and to hold some longer ones. It is quite possible that after a few years of preliminary work with these two-day Short Courses that a Course of from one week to two weeks might be put on at some central point for the whole district and be largely attended. However, it seems to me to be necessary in starting to bring these things as near to the farmer's door as possible, so that everybody in the district will have a chance to learn what these Short Courses are and what they can get out of them before they can be expected to go any great distance and stay any great length of time for anything of this nature.

My idea in running these two-day Short Courses is to work up an interest in the matter and lead to a longer course at which the different classes of stock may be taken up much more thoroughly, and at which I believe much more good will be accomplished. Until we have reached that point (and I do not think we have reached it yet) it seems to me advisable that we should continue to hold two-day Short Courses in Simcoe County.

President Creelman: I have just returned from attending some Short Courses on Stock Judging in the eastern part of the Province, a part of the Province which has not been in as close touch with the Experimental Union, and the Agricultural College, or the Industrial Exhibition at Toronto, or the other advanced agricultural organizations in the Province as we have in Western Ontario, and it was very much to my surprise, as well as to my delight, to see the immense interest taken in Short Course Stock Judging in the towns of Winchester and Lancaster. They had as many as four hundred people out at the meetings, listening to the work of men like Mr. Arkell, of Ste. Anne de Belleville, and Mr. C. M. McCrae, of the Dominion Department of Agriculture, and our own Prof. Day, Mr. Bailey and others of us whose privilege it was to attend these meetings. To see these people sit from eight in the morning until late at night listening to addresses on Live Stock and Seeds was inspiring. These meetings were organized by men like Mr. Metcalfe, and in this particular instance, by Mr. A. D. Campbell; and it looks to me, from the way these meetings were attended and the great interest that was taken in them, that Short Courses in Stock Judging have come to stay.

INFLUENCE OF A FIVE-DAY JUDGING COURSE.

By D. McKenzie, Lindsay.

The influence of a five-day judging course, though necessarily local in its purpose, presents some great possibilities as a factor in our agricultural extension work. The effects on the community may be summed up as follows: The indifferent man has his interest aroused; the man who honestly wants to learn more about his profession, gets a fund of information from the discussion and criticism of existing varieties, breeds, and methods; the College Professors and leaders in agricultural thought and practice throughout the Province are brought into close touch with the rank and file of the farming community; and lastly, it tends to create among farmers a higher appreciation of their profession.

It is evident, from the small percentage of farmers' sons in attendance at the Ontario Agricultural College, the poorly attended meetings of the Farmers' Institutes, the ragged, dirty appearance of many of the farmsteads of Ontario, that indifference exists to an appalling degree. New methods must be adopted to reach and stir these men, and a five-days' course will, if properly advertised and conducted, interest many of them; not perhaps from a genuine desire for knowledge, but because it is a new thing and the crowd is going.

To the man who is alive to his interests, the five days' judging course comes as a shower to a thirsty land. The discussion and criticism of common varieties, breeds, and methods, as carried on at the five days' course, gives him a chance to examine the variety or type under discussion at close range and to understand and remember points of merit or distinction as the case may be. He has a chance to compare his own practical experience with that of the instructors in charge, or with that of other men successful along the same line of endeavour, and to inquire into the cause or causes of difficulty and failure.

Despite the fact that Ontario has one of the best organized Departments of Agriculture in the world, there are many farmers who do not come directly under its influence. The Ontario Agricultural College reaches a considerable number, the Farmers' Institutes and other branches of the department reach a large number; but to many farmers the Ontario Agricultural College and the Farmers' Institutes are mere names associated only with the spending of the people's money. These people are not interested in the work of the College, and never attend an Institute meeting, but they will attend a five days' judging course, and there they come in touch with the College Professors and heads of the various branches of the Agricultural Department in Toronto. They hear President Creelman tell of the work done by the Ontario Agricultural College, the College Professors discuss important phases of farm practice, and the superintendents of the Toronto branches discuss their efforts along educational and organization lines. They have their eyes opened, and what was once to them a sort of infernal machine for squeezing money out of the farmer, to supply lucrative positions for political favourites, becomes a real and benificent organization.

The indifference of many farmers to education and their conservatism in adopting improved methods, has led men in other callings to under-rate Agriculture as a profession. The small financial returns secured by many farmers as a direct result of obsolete and slip-shod methods have caused these farmers to look on their profession as a little inferior to all others. If we can arouse the indifferent man to see his need of improvement, satisfy the honest inquirer after knowledge, and bring our Department of Agriculture into living touch with every farmer in the community, the result will be greater financial returns to the individual farmer, more liberal education for the boys and girls on the farm, and a greater respect for Agriculture as a profession.

MR. GEO. A. PUTMAN: As superintendent of the obsolete system of Farmers' Institutes, and also having the honor of looking after these short courses, I thought it well for me to say just a few words. The short course at Lindsay, as Mr. McKenzie has stated, was a very large class, and next to the short course at the College was probably the largest in the Province.

In the County of Victoria they have just one in the winter extending over four or five days. I would like to hear something from Mr. Campbell, who has recently held two short courses in the east. The short course work is very popular. If we confine our work to stock judging altogether, we might derive a greater benefit and deal with the seed question in some other way. We have had a great many applications this year, more than our finances will stand, for short courses in various parts of the Province. The fame of the Lindsay course has spread, and we are getting requests not only from districts in which we have representatives but from many other points in the Province.

They want one in Halton, Elgin, and Kent, and in a few other counties. We believe that the short course will not only be a good thing in itself but will popularize the Farmers' Institutes. The Farmers' Institutes have a place yet in the Province of Ontario. The records of last year are considerably above those of the year before and the attendance was much increased. Some 260,000 people were reached last year, and we believe that with the Short Course and the regular Institute meetings, and the Farmers' Clubs, and the Women's Institutes, we are accomplishing a great deal more than formerly. But we still recognize the fact that the indifferent men and the careless men have not yet been reached, but we believe that the short course and the club will solve that problem to quite an extent.

MR. A. D. CAMPBELL: If there is any value in the short course any place, it is certainly in the country, where it is most accessible to the farmers. That seems to be one of the reasons why the short course is particularly pleasing to those who attend them. It is brought directly to their doors.

Another reason why the short course is more largely attended than some of the Institute meetings have been, is in the fact that it takes pretty largely the form of demonstrations. The short courses that were held last week at Winchester and Lancaster did not consist altogether of stock judging, although that feature occupied a prominent place in the programme. We had several lectures and addresses, and I cannot let slip the opportunity of referring to the work of W. H. Day on the drainage question. Prof. Day had with him a number of letters which he had received from men who had done underdraining according to a system which had been mapped out for them by men from the College, and from which drainage they received great benefit.

We received a great deal of assistance from local men. It was necessary that we should, because we had been in the county but a short time, and it was a very difficult matter to get up and down the concessions and do the necessary advertising unless we had local assistance. And the best assistance we received was from Institute men. One man particularly, the secretary, Mr. J. P. Fox, gave us more assistance than any other man in the county. I received several letters from men in various parts of the county saying that Mr. Fox had mentioned the course, and the writer would be glad to distribute the literature. When you get assistance of this kind, it is certainly very gratifying.

If there is anything that gives encouragement to men, it is to know that the very best farmers are with you. If it were not for that fact, sometimes you would feel inclined to drop the thing altogether.

Mr. Fox secured a number of members for the Institutes. The two were blended in one at the last course. We had upwards of five hundred men, and during the last day we were asked a number of times, "What are you going to have at the evening meetings?" We thought two evening meetings would be quite enough. I am not in a position to state the relative value of a three days' course and the five days' course, but no matter whether it is three days or five days, I am sure you will have a large attendance.

Mr. Buchanan: My modest friend, Mr. Steel, while listening to Mr. Putman's remarks and Mr. Campbell's, as to the value of the short course, said: "There is nothing so good for the indifferent man as the Club." (Laughter.)

THE ENCOURAGEMENT OF UNDERDRAINAGE.

By J. H. Hare, Whitby.

There are certain sections more or less throughout the whole county of Ontario, but chiefly in the northern townships, which call for a great deal of underdrainage, and until this land is thoroughly underdrained maximum production will not be secured. I estimate that in the northern townships approximately 35 per cent. of the land, and in some sections 55 per cent., is badly in need of underdrainage. The land in these sections is quite heavy, and to make matters worse from the standpoint of ease of construction of the drains, the land is very flat; but, on the other hand, under no other conditions will land so liberally respond to this practice.

For the last three springs the seasons have been quite wet. Such a condition as this on these flat lands makes drainage a vital problem. A very plain evidence of the sufferings endured was the predominance of the buckwheat crop throughout the district, a lack of uniformity in all crops, and a great area of the crops practically drowned out, as well as a far too great proportion of the land rendered absolutely incapable of cultivation.

In one case after the complete drainage of a very flat and heavy clay field, the farmer claimed that there was a difference of fully six weeks in the length of the season between the drained field and an adjoining undrained field. A further economic reason for encouraging underdraining is that there is a great deal more satisfaction gained by the farmer when working a well drained farm. On the other hand it is very apparent that on a poorly drained farm a spirit of discouragement and even discontentedness prevails.

As a general rule all farmers do not fully appreciate the value of underdrainage under conditions such as exist on this low, heavy land. If every farmer received a course in underdrainage such as is given at the Physical department at Guelph, I venture to state that there would be twice the amount of tile put in annually. It is, therefore, obvious that a great deal of educational work is essential.

One difficulty which has hindered the progress of the work has been the poor systems used by the ditchers in constructing the drains. The results derived are in consequence often nusatisfactory and tend to discourage the practice. Then again there are countless cases in which the ordinary farmer does not know the best system to follow, the right course to take, the best outlet, and numerous other difficulties which he must have settled before he will willingly invest his money in tile. A few of the more progressive farmers have applied to the county engineer for this information. This course is not only very costly but is not always satisfactory; hence the highly appreciated assistance of the county representative whose services are not only expert, but also very cheaply rendered, the cost being seldom over $1.50.

Up to date I have made in my county over fifty surveys, including open ditch work, underdrains and awards, each of which has taken from one-half to three and sometimes four days to complete. This work did not by any means all come into the office at headquarters. Applications came in very slowly at first, but when out in the field both personal and press advertising were resorted to in order to make the work public. The farmers themselves rapidly spread the news of the opportunity of securing the expert services of a drainage surveyor for almost nothing. In one instance where I had only two applications to attend to, ten surveys were completed before leaving the neighbourhood. In fact everywhere I went a number of men who, after hearing of my presence in the community, would make a trip to where I was working and personally make application for assistance in some difficulty.

The results of this line of work have been very pleasing indeed, in fact far beyond my expectations. Nothing has given me more satisfaction than the results from the work in drainage surveying. Then again, when speaking with a farmer, or with a number of farmers at a demonstration, requests are often made for information or assistance in matters other than those pertaining to drainage, which requests in all cases I am only too glad to comply with in order that I might extend the efficiency of the office in my appointed county.

GROWING CORN FOR THE CANNING FACTORY.

By A. P. McVannel, Picton.

Possibly, Prince Edward County produces a larger average of sweet corn than all other counties of the Province taken together. This is due to the fact that canning factories are more common in this district than elsewhere. At the present time nine factories are putting up sweet corn, and there is a possibility that two more factories will do so another season. However, the increase in average of canning corn or the amount of corn put up in cans will only take place with an increase in population and with the development of new markets. There seems to be no appreciable desire upon the part of the growers to increase the average of sweet corn for the factory. The problem seems to be to increase the production per acre. In this district where the canning factories are most common, dairying is still the most important industry and consequently much attention is being paid to growing feed for stock. There is a great increase in the average of silo or fodder corn for feeding. For farmers who are so fortunate as to be situated in close proximity to the factories, the sweet corn has been a very paying crop. They have been able to deliver their crop at the factory at little cost compared with the man who has to draw a long distance, and besides are afterwards able to take advantage of the by-products, husks, cobs, etc., from the factory. These by-products are more valuable than would appear on first thought, and especially the cobs are eagerly sought after by the feeders.

The growers and canning factory owners are not at all unanimous as to the requirements of a first-class canning corn. The grower is more concerned in growing a variety which will produce a large weight of ears and at the same time leaves him with a maximum amount of fodder for feeding. The canners want a corn that is sweet, deep in kernel, tender, and one that will cut off a high percentage of corn. The reasons for this are obvious, and the growers should, as far as possible, aim to meet the requirements of the canners. The canners object very strongly and rightly also to corn possessing shallow, poorly shaped, soft and mushy kernels, and ears of poor shape. The reason being that the modern machinery they use, will not cut the corn from the ears. This is equally true of poor shaped ears as it is of soft or otherwise poor samples. The canner is interested entirely in the ears and the quality of corn on the ears, while the growers are desirous of having a large bulk of fodder or stocks after harvesting a maximum yield of ears. As a matter of fact, the grower considers the fodder so highly as oftentimes to look for his profit from feeding the fodder.

Varieties. There are a great number of varieties of sweet corn grown for the factories in the districts where the latter are common. In regard to the varieties there is also a difference of opinion. Possibly the most commonly grown and among the best varieties to select from are the following: Crosby, Early Evergreen, Stowell's Evergreen, Old Colony, Hickox, Peck's Improved, and Pearce's Evergreen. New varieties are constantly being introduced which, so far, have not improved conditions materially. As a matter of fact they have been the cause of much loss and dissatisfaction for the grower. The claims made by seedsmen regarding the merits of many new varieties have been misleading. We do not wish to discredit the description given by seedsmen, nor to infer that any description has been given for the purpose of deceiving, yet the fact remains that if the grower bases his anticipations on the description he finds in catalogues and advertising circulars he is more than likely to be disappointed with the results he obtains. Especially has this been true in regard to the statement concerning the date of maturity. Very often varieties described as "early" have proven so late as to be almost worthless; and several so-called medium varieties often fail to mature at all. A reasonable excuse may appear, however, for this apparent deception, in view of the fact that a large percentage of the seed is produced in a climate where the growers' season is considerably longer than in Prince Edward County, or in districts where canning factories are common.

Obtaining the Seed. In many cases the sweet corn seed is supplied to the grower by the factories. Much of the seed is imported by the factories from the States to the south, principally New York and New Hampshire. Increased attention is being given to the production of home-grown seed, and some few factories are giving this seed a preference. There is an uncertainty about imported seed as well as some dangers from planting home-grown seed. There is a complaint made against home-grown seed, especially in the case of the later varieties, that they have a tendency to grow flinty after a few years. This complaint is not justified, in view of the fact that one man has been growing and selecting the same variety without any change whatever for over twenty years, and has actually improved the quality of the variety as well as its productiveness. The complaint is only justified against growers who do not fully understand the principles of selection. The uncertainty of the imported seed is due to lack of vitality. Home-grown seed is not perfect in this respect. It is a fact that sweet corn is invariably of a lower vitality than any other kind of corn. As a general rule, and under present conditions, the lack of vitality is as true of home-grown as of imported seed; however, when special care has been given to curing and storing the home-grown seed, it is claimed to possess higher germinating power than the imported seed. There is a great deal of room for improvement of sweet corn for canning by selection. Much improvement has already been brought about as a result of selection practised by two or three growers in Prince Edward County. Most prominent of these are Mr. Pearce, of Wellington, Mr. Calnan, of Allisonville, and Mr. Peck, of Albany. The former has been practising selection with a single variety for over twenty years, and has produced the well-known and much-favoured Pearce's Improved Evergreen.

Many of the growers of sweet corn have, during late years, been saving their corn seed. They select enough of the best ears from the field and they dry these in the house very often over the kitchen fire, in the furnace-room, or sometimes in the sun in the open. Of these methods the only one advisable is to dry in the furnace-room. The air of the kitchen is invariably laden with moisture and steam, consequently the purpose of drying is defeated. Drying in the sun and open air is not sufficient in view of the large amount of moisture contained in sweet corn. The lack of some practical, effective means of drying and curing the seed is the greatest objection to the practice of every grower saving his own seed of sweet corn. The growing of sweet corn seed seems to be a special business by itself and one which should be practised only by those having proper facilities for drying and storing.

Vitality. Sweet corn seed is frequently low in vitality, *i.e.*, it has low germinating power. In general practice, if 90 per cent. of the seed planted will germinate, the grower is pretty well satisfied. Often, other things being equal, the vitality or germinating power of sweet corn is dependent upon the curing and care in storing. Furthermore, owing to the high moisture content of sweet corn, it demands our best attention, and in a climate such as we have, and in order to maintain the vitality, it should be carefully fire-dried. Hence the growing of sweet corn seed is a business by itself, and should only be practised by men who understand selection, and who are prepared to give it the necessary care in curing and storing, and who have the facilities for doing the work. The seed grown by men who have the facilities for curing and drying is considered to be higher in vitality than imported seed, and this method seems to be the solution for the problem of obtaining satisfactory seed.

There is much room for improved methods of selection and breeding of sweet corn. The greatest need of improvement seems to be in the direction of *earlier maturity, sweeter grain, better filled and better shaped ears and kernels, and higher yielding varieties.*

HOW I HAVE STARTED WORK IN PETERBOROUGH COUNTY.

By H. C. Duff, Norwood, Department of Agriculture.

In opening a branch office of the Department of Agriculture, the appointed representative must work out his own salvation. His manner of procedure will naturally follow the course of least resistance. This course will be directed largely by the chief kind of farming in practice and to a limited extent by the situation of his office.

The office in Peterborough County is located in Norwood, a village having a population of eight or nine hundred. Owing to the absence of a market, and to the proximity of villages almost as large as itself, Norwood attracts only a limited number of farmers. This fact early indicated a narrow scope of usefulness for the office, and necessitated the grasping of every opportunity that offered a means for making known the nature of our work. However, the suitability of the location is not questioned since there is no other that offers a greater field for advancement.

In accordance with what seems to have been the customary practice with all the representatives, we spent the first few weeks preaching the new gospel of agriculture wherever we could get a hearing. This we found to be very necessary, because few, if any, understood the nature of our work; in fact, the majority of the people had never heard of the new movement. The prevalence of noxious weeds and the need for underdraining, which we noted during our advertising tours, suggested two problems that promised to arouse general interest. In this our calculations proved to be correct since the two problems have been a basis for finding a greater field of usefulness.

With the arrival of our surveying outfit, a sufficient number of requests for assistance were received to warrant a promising start in the work. A drainage demonstration, conducted by Mr. W. R. Reek, who was on a tour through Eastern Ontario for the Physics department, aroused intense interest, and was the subject of much favourable comment in all the county papers. This particular phase of our work again received first consideration in the eyes of the farmers at the Fall Fairs where we had an exhibit.

The exhibit at the Fairs was somewhat small, since we had no plots from which to secure supplies, but the number of visitors greatly exceeded all expectations. This we attributed largely to the fact that our display was in a tent where it was the sole attraction, and where everything could be kept clean and tidy.

The principal problem facing the Peterboro farmer is undoubtedly that of improving the dairy herds. The county is admirably adapted for dairy farming, but the average farm is still supporting a few cows that are "star boarders." The men who were sent out this year to speak at the annual meetings of the cheese factories have done excellent work in forming Cow Testing Associations, and in reviving interest in those that were in existence. The individual records of the cows invariably result in better and more economical feeding, and create a desire for more knowledge on methods of cultivation, cropping, etc. To satisfy this desire, and to encourage a general improvement in agricultural practices, there is undoubtedly nothing more efficient than the Farmer's Club. Two very promising clubs are now in operation, but no more will be organized this year, since our experience goes to prove that permanency is dependent upon careful preparation. What we are aiming to accomplish is to awaken a desire in many sections for a club, and in another year we will give considerable time to the advancement of this particular feature of our work.

The High School end of our duties has limited the time that might otherwise be devoted to the farmers, but we do not for a moment claim that the hours spent with the class have been a hindrance to general advancement. We are now advertising a six weeks' course of lectures in Agriculture for young men. These lectures, to commence on the first of February, have brought forth a number of inquiries, and give promise of becoming popular. We consider that the prime object of any lecture that we prepare should be the instilling of enthusiasm in the minds of our hearers. Where enthusiasm is aroused, a desire for knowledge and advancement naturally follows. And nothing is more conducive to advancement in any rural community than the presence of an ambitious young farmer who is ever on the lookout for new ideas, and who is quick to adopt the same when they give promise of furthering his interests.

HALF A YEAR IN NORFOLK COUNTY.

By P. E. Angle, Simcoe.

The County of Norfolk, in common with all other counties, has its own peculiar problems to grapple with. Mr. Zavitz, in his report on co-operative Forestry, has no doubt told you of the sand lands of the county, which have been robbed of their forests of giant pines, and which are now said to be so poor that you cannot raise your voice on them. Part of these lands is only suitable for reforesting, but I believe that certain portions of them which are commonly considered to be worthless for farming purposes, and are being abandoned, are simply the result of a system of farming which is nothing less than robbery, and which is the more insane because of the fact that the robber robs himself.

In the great majority of cases on these lands, rye is grown year after year. In many cases the owners have given up trying to seed the land to grass because they say they cannot get a catch. Of course, they cannot when they burn their rye straw each year as soon as the threshing machine leaves the farm, and sell the rye at first opportunity; and this is done in many cases. But it is not impossible to grow the legumes on these lands. Only last week I saw a wheat stubble which had been seeded down with clover, but not a sign of clover was seen except on the hills which are supposed to be the poorest part of the field; but the reason for this was evident. Scattered over these knolls was a fair covering of manure and wherever a particle of manure could be seen the clover was growing nicely. I know of two farms where a splendid crop of cow peas was grown and plowed under this year on these light sandy lands. I know of different orchards which have been planted within the last two years on land that was considered to be blow sand, and they were growing nicely this summer. Therefore, I believe that many of these farms may, by judicious cropping, be brought to a fair state of fertility, and made to yield profitable returns in certain branches of agriculture.

Prof. Graham tells me that the soil and climate of this section is almost ideal for poultry culture, and surely with cheap land and the present high prices for poultry produce available, this should be a profitable branch of agriculture. Of course it will require a considerable amount of care and expense and time in order to obtain results, but with land at $5 to $10 per acre it surely is a practicable proposition.

But the land in the county of Norfolk is not all like this, and the farmers are not all farming in the way mentioned above. There is land in the vicinity of Simcoe worth $150 per acre, and men farming it who are experts in their business. Among these farmers there is being successfully developed a system of co-operation which has thoroughly convinced me during the half year I have spent in the county, that the salvation of the farmer lies in co-operation; and although I know that the subject is becoming almost hackneyed, I feel that its importance warrants my mentioning briefly some of the things which it has done for the farmers of the county and for the county as a whole.

Six years ago the apple crop of the county was meagre in quantity and poor in quality. Though an occasional orchard was producing a small amount of fruit of fair quality and yielding perhaps a small profit, under moderate treatment, the average orchard was a dead asset to its owner. To such an extent was this true that many men were cutting their apple trees for firewood. Not only was this true, but slowly and steadily the farms of the county were being abandoned. All branches of agriculture were backward.

In the winter of 1906 the Norfolk Fruit Growers' Co-operative Association was organized with a membership of seventeen. The members began to co-operate to produce better fruit. Their old, unsprayed, unpruned, uncultivated, unmanured, unprofitable orchards began to be sprayed, pruned, cultivated, manured, and profitable. The membership increased to fifty-two in 1907, to one hundred and fifty-two in 1908, and to one hundred and eighty-eight in 1909, and the quantity of apples in the county suitable for barreling has been doubled in the same time. Then by co-operating to put up a uniform pack of fruit and by dint of diligent advertising, chiefly by putting their fruit before the public, the price received for apples has been likewise doubled.

As a result, the one hundred and eighty-eight members of this Association will receive about $60,000 for their apples this year. Orchards will net their owners from $2.50 to $6.50 per tree. I know of one orchard of one and one-half acres which will net $440, and another of five and one-half acres which will net $1,000. No more orchards are being cut down, but thousands of trees are being planted each year.

Less farms are being abandoned. The value of farm property has increased enormously, and outside capital is being quite freely invested in the farms of the county.

But of far greater importance than all these is the impetus that this co-operation has given to other lines of agriculture, and the effect it has had in extending co-operation among the farmers. The members of this Association and their neighbours outside have seen what can be accomplished by scientific methods and intelligent co-operation in orcharding (which, by the way, forms only a small part of the agriculture of the county, since only 10,201 acres of the 271,394 acres of cleared land in the county is devoted to orchard purposes), and they are beginning to awake to the need of a careful study of and the almost unlimited possibilities in any branch of agriculture in which they may engage. It is not unusual to hear a farmer say: "I have only been dabbling at farming till just lately. I am just beginning to farm now, and I want to learn as much from the other fellow as I can."

Last spring a farmers' club was organized at Simcoe with a membership of one hundred. They are just now resuming activity for the coming winter, and in their outline of work is the perfection of a plan of co-operation in growing and selling potatoes. And thus the good work spreads.

Now I would not have you think that the way of the co-operator in Norfolk has been nothing but pleasantness and that co-operation there is perfect. The association referred to has had its drawbacks, the chief of which has been the result of the old, old story of petty jealousies among members and a lack of faith in one another. These things are being gradually overcome, however, and as each difficulty is surmounted it reveals once again the fact that for successful co-operation a high sense of individual responsibility among the co-operators and competent management of the business are the prime essentials for success.

THE CHAIRMAN: Co-operation among farmers, especially in the fruit business, has done a lot for the farmer, and I believe that is the reason they organize Farmers' Clubs. It is owing to the success of the Fruit Growers' Associations that the farmers are beginning to see that there is something in co-operation.

PROF. ZAVITZ: I am sure we are very much interested in this report from Mr. Angle. Although he has not been very long in the county of Simcoe, he has done considerable work, and has much more before him. When at the Simcoe Fair in Norfolk County, some four or five years ago, I met Mr. Johnson, who drove me out to an orchard some three or four miles from town. I had heard something about this orchard and I was pleased to have the opportunity of looking at it, as I understood the orchard had been for twelve or fifteen years allowed to simply grow wild and had produced practically nothing. But Mr. Johnson took it over, cultivated the land, trimmed up the trees, put in a cover crop, and in the spring sprayed the trees; and the next year, when I was there, the orchard was simply loaded with the most magnificent crop of apples, nearly all Spys. There was scarcely a wormy apple to be found.

I remember going into another orchard just across the fence that had not been cared for, where the man did not believe in spraying, and it was certainly a great object lesson to compare these two orchards. In the one it was difficult to find an apple that was not wormy, and in the other it was difficult to find a wormy apple. In one orchard the packers were busy at work and nearly all the apples could be put in the barrels as first-class, whereas in the other orchard a great many of the apples were being hauled to the evaporator.

Having seen this, I can appreciate more readily some of the statements Mr. Angle made this morning. They are finding out that some of what they call waste land, is suitable for fruit, and I believe we will hear a great deal from Norfolk County in connection with fruit-growing.

PROF. HUTT: Mr. Angle has not told us anything about the school work at Simcoe. I am sure he must have some valuable experience in that connection.

MR. ANGLE: The reason I did not speak about school work was because I did not wish to talk about anything that I had not done. I have not done much in the school work. I advised the pupils to take the regular course in the High School, except Latin and Greek, which periods I fill in with Agriculture, and you will be surprised to hear that five boys, the eldest being fourteen and the youngest eleven, who had just passed the entrance, took up the work.

One of the High School teachers patted me on the back and said, "You have my sympathy, old man, trying to teach these fellows how to farm." I told him I did not want to teach them farming, but I would try to combat that influence of the High Schools which tried to take them away from the farm. I took the five boys to the Horticultural Exhibition at Toronto, and they were so delighted that they are going to the Fat Stock Show.

I feel very optimistic with regard to the possibilities of the school course. We are starting where the influence is bound to spread. Every one of the families of these children wrote to me and said the boys would rather spend the time at their agricultural studies than any other. One of the parents told me the other day that he had two boys going to the school, one taking Agriculture, and the other boy thought he was missing something, so he intended starting Agriculture after Christmas.

I teach from three to four on Monday, Tuesday and Wednesday, and between two and four on Thursday. It does not in any way interfere with the regular programme at the High School, but it interferes with my time. I have a considerable amount of office work. Four different boys in the High School who are not taking up Agriculture have asked me about the course, and one of them is now selecting weed seeds in order that he may take it up next year.

PROF. HUTT: I have been pleased to hear Mr. Angle's address, and to know that he has done such a large amount of work in the short time he has been in the county. I have judged at the Exhibition in Simcoe a number of years, and I do not know of any county in the Province that has made the strides Norfolk has in the last five or six years.

I was in Mr. Johnson's orchard the first year he sprayed his fruit trees, and I can corroborate all that Prof. Zavitz has said. This matter of improvement is all left to one or two live men, and they have to regenerate the work in the whole county. They have a number of bright men in Simcoe: Wyner, the horseman; Groff, the plant breeder; and Johnson, the fruit man. A few of these men have kept things going there, and they have brought Norfolk right to the front.

MR. ANGLE: If there is any success in this school work, it is largely through the preliminary work that was done by James E. Johnson, and the impetus that had been given to the farming community through the work started by him.

A MEMBER: I was sent down to Norfolk County last week to interview Mr. Johnson, and he informed me that a great many people have been planting orchards lately, and a great many people were coming in to invest in orchard lands. He said there were many inquiries for lands for sale. The Co-operative Fruit Company intended to have a land exchange in connection with their Association.

THE POSSIBILITIES OF AGRICULTURE IN DUNDAS.

By A. D. Campbell, Morrisburg.

Dundas, although it had, according to the last Bureau of Industries Report, 30 per cent. of uncleared land, is one of the good counties of Ontario. Of its 237,000 acres, 45,000 acres were swamp or slash land, and 28,000 acres were wooded. But the next report will show a different percentage, because the fires of 1908 cleared thousands of acres of slash land, while the plow of 1909 has made large areas ready for the seed.

In so far as large municipal drains will drain swamp land, much of this is already drained. Although it is in some places mucky in nature, in but few instances is the muck deep, and when science has solved the muck land problem, this land will be valuable.

Anything that Dundas may have lost owing to its uncleared land is more than made up for by its large areas of extremely rich and fertile soil, which is for the most part a very deep clay or clay loam that, under average conditions, seems sure to produce excellent crops.

At the present time, by far the leading industry is dairying. In some sections the raising of hogs and horses is extensively carried on, but nearly all agricultural effort seems to centre about the production of cheese and butter, and for its size, Dundas leads all other counties. This does not mean that the Dundas farmers are highly skilled dairymen. There is much room for improvement, and the day is coming when the dairy output will be much greater than it is to-day. A correct knowledge of the cows' milk production, a careful selection and breeding from milking strains, and proper feeding methods, comprise the solution of greater production here as elsewhere. With better milking strains and better feeding, the possible dairy output in a county with such a rich soil for producing feed, is enormous.

But closely wrapped up in the agricultural possibilities of any county are its agricultural problems, and Dundas has them. They are: the need for Underdrainage; the summer feeding of Dairy Cattle; the Weed problem, and, most serious of all, the mad desire of the boys and young men to leave the farm.

With reference to drainage, it may be said that the surface of the soil might be described as level, but not flat. So level is it that thousands of dollars have been spent in constructing immense ditches to carry away the water. These ditches serve as excellent outlets for underdrains, and only when they are used as such, will they give full returns for money expended. But little underdrainage has been done, and of its benefits the people, from actual practice, know but little. In addition tiles are not made at any nearby point. Moreover, the people are tired of paying for ditches, and hence are loath to expend more money for drainage. Such is the drainage problem in Dundas.

The question most frequently asked me during the past summer was, "How can I best feed my cows during the months of July and August?" By growing large quantities of corn the people can carry through the winter more cattle than they can feed during the summer. And right in this connection comes up the question of corn-growing. Although large quantities are grown, no Dundas farmer feels that he has yet discovered the best corn, the best method of growing it, or the best method of making ensilage. All that I have to say is this, that from a corn census which I have made for the Ontario Corn Growers' Association, and from actual observation, I have found that the varieties and methods are many and varied. Much of my time during the next few years will be devoted to studying the growing of corn in this county.

Then the Weed problem is a vital one. Dundas has perhaps not so many weeds as some other counties, but it has in immense quantities a few of the worst.

In my estimation what should most seriously concern the Dundas agriculturist to-day is the migration from the farm of its boys and young men. In no part of Ontario have I seen this so marked. It is with this question that I, firstly as a friend of the farmer, and secondly as a representative of the Ontario Department of Agriculture, would endeavour to cope, and in grappling with this problem more than with any other; would results be slowly obtained.

The outlining of these problems may seem to have but little connection with agricultural possibilities of Dundas, but the relation which I, as a representative of the Ontario Department of Agriculture, bear to these and others, is the relation which I bear to the Agricultural possibilities of the county.

Dundas with its fertile fields and industrious people will, with the adoption of the best methods of intensive farming, become a county of unbounded possibilities.

THE CHAIRMAN: I think there are a great many counties in this Province where they need better underdraining. The farmers as a rule do not know the value of underdraining, or if they did, they would not be backward in expending the money in buying the tile to underdrain their farms. I firmly believe it will pay 25 per cent. on the investment the first season.

MR. ROBINSON: I have heard a great deal about Dundas County since I have been here. I am a man from Dundas and I know considerable about that county, and I think Mr. Campbell's paper is a good one.

An immense amount of money has been spent in opening up drains through the county of Dundas, which is a level county. The trouble now is, that they have gotten sick of the drainage business, and if you mention a drain the farmer is up on his dignity at once. They have gone so far with draining that they have gotten to a point where a little more will make it useful. Having so many large drains they will be able to put in underdrains and get the benefit that they could not secure in any other way. The money spent so far has been practically wasted unless they go a little farther and make it complete.

I have found that the tendency of the boys to leave the farm is quite prevalent. We have some good schools down there, and we are very close to McGill and Queen's Universities, and the people find very little trouble in giving their children a good education. Some of the young men have gone out into the world and have made a great success and they are held up to the other boys. A number of them go to college, and become doctors and lawyers, and the others, who are a little stupid, stay on the farm, and they are thought to be insignificant sort of men who are not worth bothering about.

I expect in a few years that Mr. Campbell will get the people to realize the importance of agriculture, when they will go back to farming in Dundas County, which will become one of the most progressive counties in the Province of Ontario.

PRESIDENT CREELMAN: I would like to say a word in reference to the drainage proposition, which has been suggested to us by Mr. Campbell and Mr. Robinson. I see that you have no provision for a discussion of this problem, which has been agitated so much during the last three years. Three years ago we were enabled to get a small grant from the Government so as to put on the road two or three undergraduates of the College who would go to any man's farm in the Province, and for the mere expense of his railroad trip, which is one cent a mile, and for his board while with the farmer, he would give the farmer a complete drainage plan of his entire farm that would enable him, without the expense of an engineer, to thoroughly underdrain his own farm without any further assistance from any person on the outside.

With the help of only two or three young men, we have been able to drain 32,000 acres in the Province of Ontario, and we have been able to increase the output for tile from a decrease in 1905 to an increase of over 200 per cent. since we took hold of the work in 1905 up to the present time. Last year twenty-nine millions of tiles were produced in the Province of Ontario and shipped to the farmers.

While at the Winchester meeting and the meeting in Lancaster, we discussed this matter with the farmers of Dundas and Glengarry, and from the lowest to the highest estimate, the farmers in the Province of Ontario would be benefited by draining to a very considerable extent, the estimates being from 15 per cent. to as high as 60 per cent.

THE IMPROVEMENT OF COUNTRY ROADS OF ONTARIO.

Suitable Material, Method of Construction, Proper Maintenance, Etc.

By A. W. Campbell, Deputy Minister of Public Works, Toronto.

I am sure it is quite unnecessary for me to emphasize the importance of better roads to this Experimental Union. It might be important, however, for me to refer to the fact that so far as roadmaking is concerned, to my mind, it has been a series of experiments in this country, extending over nearly one century, and I have reached the conclusion that the time has about arrived in the history of Ontario when we should cease experimenting in this particular, and that we should try to have some reasonable standard of roadmaking for each county and township in the Province.

It is a well known fact that there are a few principles underlying the construction of roads, which, if we are to make a success of our expenditure of money and labour, must be closely observed. You all understand the absolute importance and necessity of observing the principles in connection with the work in which you are especially interested, and in the building of a road as well as in the construction of any other public work, there are principles of construction which must be observed if success is to be achieved, and it is useless and hopeless for us to go on as we are still doing in many of the municipalities of Ontario. You are aware that notwithstanding the fact that in the last few years about one-half of the municipalities of the townships of the Province have commuted or abolished the system of statute labour, yet in a great majority of townships that system still prevails. And if those who have charge of this labour were in a position to concentrate that, so as to produce its value in actual work, not in the exhaustion of time and effort, what an enormous work could be performed with the labour that is taxed against land in this respect.

Statistics collected by our Department show that there is a little over a million days of statute labour still performed on the roads of Ontario. When that million days of labour is not concentrated but scattered, as it is, although these men do work faithfully, nothing but temporary work, patching and repairing can be expected. In addition to that, we have cash annually raised by direct taxation, making in all about $2,100,000 or its equivalent, spent upon the roads of Ontario annually. The clerks' returns reported at our Department show that in the last ten years there has been spent nearly $21,000,000, or its equivalent, in labour on the roads.

Now, I have frequently stated that if this labour and money were given to me and I were placed in a position to concentrate it and utilize it as I saw best under fixed plans and specifications, I would undertake to macadamize in a first-class manner every rod of road in Ontario upon which the expenditure has been made in the period of ten years. If it has not been accomplished, then why should we not ask the reason why more has not been made of this money and labour?

The work has been carried out in an indefinite, shiftless sort of way. Pathmasters and road commissioners are being changed every year, and they do not get a sufficient opportunity to learn even a little of something about the principles of roadmaking before they are set aside and others placed in their position.

If we had some trained pathmasters or trained road commissioners, and they were placed in charge of the work, and their positions were made secure, so that they could make plans of the roads of the townships and state what improvement is required on each of these roads, an improvement that would be in keeping with the requirement of the traffic, and that they could commence at a certain point and utilize the labour and the money as far as it would go each year in doing some fixed and definite work and extend that from year to year, in a very, very short time we would have a long mileage of first-class roads in each township.

Under the county road system in the county of Prince Edward, in the last two years, they assumed about one hundred miles of leading road in that county. That county now concentrates the expenditure that used to be placed upon one hundred miles of road, and they commenced at a certain point last year. They first equipped themselves with a complete outfit of road-making machinery. Without first-class implements you cannot do first-class work. They purchased regular crushers and steam rollers and last year they macadamized twenty-two miles and this year a little over twenty miles, making a stretch of forty-two miles of road in two years' time. Fancy what that county will accomplish in the next ten years! Fancy what they would have to-day to show for their expenditure if they had commenced ten years ago!

I do not believe it is a question that is going to disturb the people as to how the money is going to be raised. We are raising an enormous amount of money now, but the unfortunate part of it is the way that money is being handled. We want to work economies in connection with our municipal taxation, and here is where the members of this Experimental Union with your special training along these lines and with your ideas of how carefully and cautiously matters in general should be studied in order to produce the best results for your labour and expenditure, can help. There is no question of so much importance to the people to-day as that of the improvement of the roads, and there is no question in which you can afford to devote some of your special time and some of your training to better advantage than to the laying down of capable and competent plans for the improvement of our roads.

Reading an account of what you are doing here, while coming along in the train this morning, I noticed that you had been carefully studying the wisdom of underdraining in connection with your farming operations. As an engineer of a good many years' experience in matters of drainage, I can only say that this is an exceedingly important matter in connection with your farm operations. It is, as I think, the basis of all farming operations. Unless land is thoroughly and carefully and perfectly drained so that the pores of the soil may be thoroughly and fully opened to receive the benefits that result from the falling of the rain and from the nourishment of the melting snow, it is useless for you to attempt to farm successfully that particular land. Tile draining and its importance in connection with farming cannot be over-estimated. Tile draining of the foundation of the ordinary road is the first principle that must be observed in road-making, and unless we do see that the foundation is thoroughly and properly drained, it is as useless and as futile for us to attempt to build a road as it would be to attempt to put up a first-class building on a wet and yielding foundation.

In fact the principle of road-making is simply boiled down to the question of drainage. It is the soil after all that carries the load. The natural soil, the clay and the sand which forms the foundation for that road has to carry the load and that should be drained. Where the land is porous or wet or boggy, it may be necessary to resort to tile draining. Place a drain underneath the roadway where there are holes or boggy places, sandy or moist spots, so as to remove all the moisture and create a hard foundation. It matters not what you put on the surface, whether it be gravel, broken stone, vitrified brick, or asphalt, if the foundation is moist, the frost enters that foundation, acts upon that moisture and when the frost disappears in the spring the foundation is left loose and unsuitable, and the crust that has been created on the surface is simply a crust resting on a yielding bottom that will crack, break, and rut under very slight traffic.

The foundation is the first thing to be obtained. The placing of the surface material, the gravel and the stone is the last subject to be considered. The great majority of our roads for years to come will necessarily have to be earth roads, and in many instances where these roads are properly drained and cared for, they are as useful and as serviceable for the little traffic that passes over them as an asphalt pavement; but in a city where the traffic is extremely heavy, such a road would not do. We should classify these roads according to their importance. We have what we call leading roads, the main arteries leading to the city. We have other roads that serve only neighbourhoods and are used only by occasional teams. Then there are the division lines and back concession roads that are used by only one or two farmers, and not at just the season of the year when roads will be injured by travel. If these roads are properly *drained* and *crowned,* and attention is given to their maintenance, they will be quite serviceable roads, and can be made what would be considered ideal roads for ordinary traffic.

When we reach the next class of roads where the traffic is a little greater and where the roads are used during all seasons of the year, then it is necessary to resort to a covering of some material that will resist the wear, and that will shed the water and make a hard, smooth, wearing surface. That is why the gravel or broken stone is placed on the road. Ordinary land gravel is composed of 50 per cent. of sand, which is useless in road construction and should be eliminated. The best practice suggests that all gravel should be placed through crushers where the larger stones are broken and where the smaller stones are reduced to cubical pieces so that they will bind together and where the sand is abstracted and nothing but clean stone is retained for the road bed. Gravel of this kind is almost equal to crushed stone. Where gravel is not plentiful, we believe then in using crushed stone of the best quality that can be obtained within reasonable distances of the work. It is not practicable for us to always be able to select ideal road-making material for country roads. Trap rock is supposed to be the best. It has a hardness and toughness that will resist wear and last a great many years, but trap rock is only to be found in certain sections of the Province, and the cost of forwarding it and distributing it through the country would make the price impracticable. We have to use the best material available. There are many localities unfortunately situated in the Province, which have neither stone nor gravel for use on the roads and which are under the necessity of importing crushed stone by rail. The cost of such roads is not expensive in the vicinity of towns and railway stations and in view of the greater durability of crushed stone, it is frequently desirable to use that material, particularly when it can be shipped in by rail close to the stations even where gravel may be obtained. The greater strength of crushed stone and the greater durability will in the end repay abundantly the additional cost.

In connection with gravel roads or broken stone roads, I wish to say that it is useless for us to go on hauling and dumping gravel, spending our time and money in putting on roads gravel that is not suitable for the requirements. The man who is charged with the making of the roads in a township should have some scientific knowledge of these things, so that he can pass upon the quality of the material and say how it should be best treated so as to make it most suitable for the work in hand. Prepare the material which you have on hand in the most competent way to make the most of it. This is where the experimenter can inform himself to the best advantage and the fact of his constantly being in touch with the work will, in a very short time, make him a most valuable official to any county or township. Every township should have in its employ one man of this description who will plan in a general way the work of road-making, and who will say what drainage should be provided and who has sufficient scientific knowledge to handle an ordinary drainage level and who can take levels, plant the stakes, map out the work and see that proper tools are provided and that the fall for the water is down hill and not to make the ditch first to find out whether the water will run to the north or south.

Take the proper levels and see that you have the proper directions before you commence the work of construction and then arrange to have the outlets made so as to dispose of the water in the smallest quantities, never leading it a long distance along the side of the road that will fill in and obstruct its flow, injure the fall and ruin the road.

Drainage is of the greatest importance, and if I should only attempt to emphasize this one question to-day, I would leave you to consider the question of how broken stone should be prepared and how it should be applied. I would emphasize drainage as being what I believe to be an exceedingly important matter in connection with road-making. We can make ordinary clay roads by proper drainage, and proper grading and shaping and attention.

First-class serviceable roads for the ordinary requirements of certain districts throughout the Province can be made in this way, and only the more important roads really demand the application of gravel and broken stone. The first thing in this road problem is to get the council to look upon it as an important matter, and after they have decided on their plans, they should place the work in the hands of a man who has sufficient scientific knowledge and training to undertake the work and see to it that whatever expenditure is made each year, whether of labour or money, that it should be directed along lines of these particular plans and that every year's work, every day of labour, and every dollar of money should be made to show its value in permanent results. The plans which we follow generally in designing for the township is to classify the roads under three heads: 1. The leading roads, upon which most of the traffic passes; 2. The neighborhood roads leading on to these and subject to the traffic of the particular neighborhoods; and 3. The concession lines. The most important road should be graded to the width of twenty-four feet, the second class twenty feet, and the third class eighteen feet.

Experiments have taught us that these are about the proper widths to be used in connection with township work. After the foundation has been drained carefully, the road should be crowned so as to shed the water from the centre into the ditches. That crown should be about one inch to the foot from the centre to the edge of the ditch. That is where the road is twenty-four feet wide. The fall from the centre to the edge of the ditch should be twelve inches.

After the road has been graded, it is advisable to pass a heavy roller over it so as to compact it thoroughly before the traffic is allowed to go on. If the traffic is allowed to go on the loose earth, the first team will rut it and after that the traffic is pretty well directed into that rut. Water is held there and the injury commences. It is an excellent practice to roll with a twelve to fifteen ton steam roller. Horse rollers weighing from six to eight tons are being used with a great deal of success. A steam roller should be in possession of every township municipality in Ontario where road-making is being done.

You cannot do this work properly without proper implements. If township councils would defer their money to the purchase of a complete outfit of machinery for the first year, they would be further ahead than by going on in the usual way without implements to do the work properly. Do not make the great mistake that many councils have made in flying away at once to purchase machinery without making provision for its operation and maintenance, and without studying who is to look after it. In many instances these machines are placed in the hands of inexperienced men. A standard should be established that could be followed to advantage and then the money that is being appropriated will be appropriated to useful purposes.

In conclusion, let me urge that in our modern road-making of to-day we seek to find and employ experienced men in this work; that we use modern road-making machinery; that we select our material with care, that we drain thoroughly, that we grade in a workmanlike and permanent way, and that throughout all we seek economy in efficient management of men and teams in this work.

THE EX-STUDENTS OF THE O. A. C.

By G. S. Henry, Oriole.

I am very pleased to be here this evening, although not so pleased to have the onerous duty of responding for the large body of ex-students here, and those who are not here to-night; but with the gift of office there also goes certain duties. While sitting here I was wondering whether it would not be possible for the President of the College to extend this banquet over a couple of days, whether, if he could do this, we would not have a better Union. I have been wondering what was the cause of the increase in the attendance at the different sessions which we have been holding for the last two days; the increase seemed to be very rapid, and I was very much surprised at the large number we had in the latter part of this afternoon. I was somewhat at a loss to know, though I am an old student. I have realized since sitting here that after all we were leading up to the climax here to-night. I think, Mr. President, if you can only extend this banquet in some form or another, give a little of the good things to us, and so spread them out, we might have a better attendance at our Convention in its earlier stages.

While sitting here I cannot help looking back over the years that have gone. Although they seem to have been increasing there are not so many of the Old Boys here this evening as I have been accustomed to meet—not so many here possibly as there were a year ago. Possibly the numbers of students and ex-students of more recent years are increasing so rapidly that those of other years a little previous seem to be diminishing, although there is not the same reason, there is not the same drawing for the ex-students as years go by. The older men feel that their old classmates are not as likely to be present at the Union, and after all that is one of the chief reasons that we come back. At the same time, I have reason to be glad that I do come back. I always find some fresh inspiration when I come back to the old College halls at the O.A.C.

Then again, I think of this gathering here to-night, and as one of the reasons of its size and of its importance, I am led to say that a great deal of it is due to the ex-students of this College. I am speaking largely now of the ex-students of from fifteen to twenty years ago. They were the men who did the pioneering for our College, they were the men who went out and spoke through the country, up and down the concessions, championing the College, when to be a student of the O.A.C. was not as popular as it is to-day, and it was not as popular with the Government as it is to-day. A great deal, I say, is due to the work of the old boys of fifteen and twenty years ago, their loyalty to the College made such a College as it is to-day possible. But I don't think that they have ever forgotten their duty, even the more recent students have not forgotten their duty. We all seem to be loyal; we are all students at heart. It appears to me that the term "ex-students" is a very apt one. He was a genius that first suggested that word for the graduates of the O.A.C. I don't know why, but it always appeared to me that the O.A.C. students always were students after they had left the College. The word "ex" merely suggests outside of, away from, the College, but they are still students there, always students at heart. The term is very much in advance of the term "graduate." A graduate seems to leave his institution, and that is the end of it, but with us here we remain students. The oldest of us is as young a student as any here, so far as ambitions are concerned. But I think we as an ex-student body are reminded that we have not accomplished all that we can yet accomplish. We have realized surely this afternoon from the address that the Deputy Minister gave us on the work that is being done over in the little country of Sweden, that, after all, while we seem to have been progressing very rapidly, we have not yet reached the standard of producing wheat to the amount mentioned. We have yet something to learn, and surely it is for the ex-students and students to keep behind the College, to back up the Legislature in giving more liberal grants to the cause of agriculture in the Province.

There is another thing I would like to suggest before I sit down, and that is, to the Minister of Agriculture as representing our interests in the Cabinet of the Province of Ontario, the desirability of developing the residential side of the student life here. I do not know of anything that struck me so forcibly in the few months I was privileged to spend at the College here. It had been my privilege to take a course in Arts, at Toronto, and I thought that I got along there very well, that I had become well acquainted with a large body of students, and they had a large influence on me; but I am free to say that in the six months I spent in the College residence here I got better acquainted with the hundred boys or more that were there in that six months than I had in my own instance in my whole four years' term in the University of Toronto. I think that it is a very important phase of student life, the residential side. We cannot press it too much to the front. I understand they are not all residential students now, and I am sorry for those who are outside, who never can have the advantages and privileges of a residential student. They can never really fully get into the spirit of the College as do the residential students. I feel that I am speaking for the ex-students when I say that the Government would be doing a wise thing in spending more money in extending the residence, so that all students who come here in the future may, as far as possible, be housed and taken care of within the college walls itself. (Applause.)

I have possibly spoken long enough. We have some of the men who are representing the large interests of the Province with us to-night, and we are anxious to hear some suggestions from them, and I feel that they are only too willing to do all that they can for agriculture if the people will only back them up. That is always the story they tell us when we go there. "Educate the people, and we will give you what you want." It is for the students and ex-students, therefore, to educate the people of the Province to the interests of the College here. I thank you on behalf of the ex-students for again extending the hospitality of the College to us this evening.

ADDRESS.

By Hon. James S. Duff, Minister of Agriculture, Toronto.

Until I heard Mr. Henry I had intended to use the word "graduates" and "undergraduates," but after listening to what he had to say with reference to the term I felt that possibly I was well-advised to follow his line of thought in reference to it. Permit me to say that it affords me very great pleasure to be with you to-night. It is the first time I have been privileged to meet with the students, the ex-students, the staff, and those who are associated with you in your work here at your annual banquet, and before I say a word or two in another line there is a thought that has occurred to me that perhaps I ought to tell you of. I have been at banquets, and I have been at gatherings where we have had great numbers of young men, but I think I am safe in saying that I have never been at a banquet in my life where there has been the same order and the same good nature displayed on the part of the students as there has been displayd here to-night. (Applause.) I can very well understand why President Creelman in his opening address should have paid such a compliment to the gentlemen who had been associated with him in his work on the staff of this College. I can well understand that he was paying a compliment that was not only worthy, but perhaps more than worthy, because if it were not that the President has associated with him men of the calibre described by him to-night, we would not have that splendid order that has been exhibited at this gathering. Evidently if we are to judge from what we have seen to-night, every professor in connection with the O. A. C. in the discharge of the duty that comes to his hand in his own particular line has the faculty of impressing that splendid conduct upon those whom he comes in contact with which is being exhibited here.

My duty to-night is to introduce the gentleman who is to be the speaker of the evening, but before I do that you will pardon me if I allude to one or two thoughts that have been thrown out during the discussion this evening. I was very glad indeed to hear Mr. Henry speak as he did with reference to the residential wants of this College. I was not privileged to receive a college education, but it is not necessary that any man should receive a college education to know the benefits that must accrue from residence during college life. The consensus of opinion amongst gentlemen all over this beautiful Province of ours who have had college training, and have been in residence during that time, goes to show that possibly they derived as much benefit from residence in College as from the lectures which they received from time to time in the various classes. The very fact of boys rubbing shoulders with each other, the very fact of boys from different localities and sections of the Province, and not only from different sections of our own Province, but different sections of Canada, and outside of Canada, in the Republic to the south of us, and also from our South African and Australasian colonies, meeting with each other and talking over conditions as they find them in their native lands—must tend to broaden them and make them better fitted for the duties of life in after years. And as far as I am concerned, I shall be glad if in any way we can help to alleviate the difficulties which appear to be in the way at the present time in reference to the matter of which I have been speaking. (Applause.) But do not forget there is something else to be said. This College is growing very very rapidly, and the thought that occurs to me is this: were we to increase the residence accommodation so that by next year we would be able to cope with your requirements, the probabilities are that, the way things are moving, within another two or three years you would require another extension, so that it is a very difficult thing to say what may come in the future in this way. But I think you are all perfectly well seized of the fact that it is the earnest desire of the Government, irrespective of the gentleman who may be the Minister of Agriculture for the time being, to aid this institution in every possible way, and I think I am safe in saying that not only is that their desire, but that has been their aim, and I think you all know that a great deal has been done in that way.

Perhaps I would say a word in reference to another feature in connection with the work of this College which I think has met with a great deal of approbation throughout the Province, and that is the means of endeavoring to disseminate the knowledge brought to the students of this College in the establishment of College representatives here and there throughout this Province. The great trouble for many years—and of course it might be expected it would be a great trouble for many years in connection with the College—was that it was new. The conditions of the Province were not so favorable as they are to-day. But now with the splendid work that the College has done, with the fact that you have amongst your students and ex-students men from every County in the Province, and the fact that the people are possibly reading agricultural journals to a greater extent than they did years ago, make it a very much easier task for those who are going amongst the people, as the district representatives do, to bring the knowledge obtained at this College home to the people, than it would have been in former years. It is very gratifying, indeed, that the movement which was launched with some degree of diffidence, which it was doubtful on the part of the Government whether it would be successful or not, is proving successful; and not only successful from the standpoint of the gentlemen who are doing that work in the various counties where these agricultural representatives are situated, but what is better still, is receiving practically the unanimous approbation of the people in these various counties to such an extent that the Government has already received applications to establish more of these stations during the coming year. (Applause.)

My good friend, the Minister of Lands and Mines, will give you a great treat, from the fact that the great bulk of the young men, and perhaps the older men, who are here to-night are not acquainted with the conditions in Northern Ontario, and before I introduce him I have just another thought to give you. Mr. Cochrane will tell us, as no doubt he is justly entitled to, and we will be glad to hear him tell, of the greatness of our mineral and forest wealth in the north country. But we have an immense agricultural wealth in the north country, and after all, when all is said and done, if the people of this Province are only true to themselves, and true to the position in which they find themselves, there is not the slightest doubt in my mind that very many years will elapse before the Province of Ontario shall lose the proud position which she occupies to-day in this Dominion of Canada of being the banner Province of the Dominion from an agricultural standpoint. Every young man who graduates from this College, whether he goes back to his own farm, or whether he should leave the farm and drift into some other calling, should be possessed of that information which, whether he is an agriculturist himself or not, will benefit the agriculturists where his lot may be cast. I look, from the fact that your roll is increasing year by year, to a very much greater good emanating from the teaching of the President and the staff of this College in the future than even in the past.

It is my pleasant duty now to have the honor to introduce to you the gentleman who represents the interests, perhaps more than any other gentleman in the Government, of Northern Ontario; a gentleman who years ago went into that, I was going to say, unbroken forest, and by his own indomitable energy and perseverance, made good, became one of the best business men in the whole of Northern Ontario, and who knows Norther Ontario as well as any gentleman around this festive board to-night knows the city of Guelph. I am sure I am not saying too much when I say that the Hon. the Prime Minister of this Province, Sir James Whitney, has no gentleman in his counsels any higher in the estimation of the people of the Province of Ontario to-day than the gentleman whom it is now my pleasure to introduce, the Hon. Frank Cochrane.

ADDRESS.

By Hon. Frank Cochrane, Minister of Lands, Forests and Mines, Toronto.

I assure you that I hardly deserve the very flattering remarks made by my colleague, Mr. Duff, who, by the way, with Dr. Pyne, is one of the spendthrifts of the Government. I have to do the laboring in order to get the money for them to spend, so you can understand right well how it is that he is so free with his promises here to-night.

Your worthy President, when he wrote and asked me to be present here to-night, said, "It is merely an informal affair, and we only want you to speak five or six minutes." That caught me, that is the reason I am here. I don't profess to be a speaker. I was caught too late. I lived too long in the woods. He also gave me a subject to speak on, and that is, "How to Get On in the World." I do not know why he selected that for me. I know nothing about that, but I will just say two or three things as they strike me, and the first is, that you, who are attending this College, both ladies and gentlemen, are taking the first step to make progress much faster in this world than those who have not had the privilege of attending such an institution as the O. A. C. If you can attend here for two or three years, and find out all the technical points about soil and about seed and about how to do these things, and also to go on and understand about drainage, about forestry, and about other things, as I understand you are taught and study here, how much greater it is for you than for those who had to hew out their homes for themselves and take what their forefathers handed down to them in regard to agricultural processes. But when you analyse the thing, in any walk of life, it seems to me that the best of all is what you can make it yourself. If young men would only put the same vim, the same energy, into their work of life, no matter what that work is, that they put into a game of football or lacrosse—and, mind you, I believe in these games, they are manly games, and I think that young men who enter into sports are better men for it—if you will use the same energy and determination that the boys who went to South Africa used, your walk in life will be easy, I assure you, and you will walk up the ladder much faster than in any other way. As I said before, I don't know much about this subject, but I do want to take the liberty of speaking a few words on behalf of Greater Ontario, because I do not propose, and do not pretend, to call it Northern or New Ontario. It is Greater Ontario. Would you believe it when I tell you that there are only one-fifth of the whole in the older part of the Province of Ontario, that there are still four-fifths only partially developed, and three-fifths that the surveyor has not even been over, and what the great possibilities, what the great resources of that country are it is impossible to say. As you know, a large portion of our revenue outside of what we get from the Federal Government comes from that section of our Province, and few realize how mining has jumped to the fore in the last few years, because up till last year we were the third province in the production of minerals in this fair Dominion of ours, but last year we produced 36 per cent. of the total product of the mines in the Dominion; and if you will take out coal from the production of the two sea Provinces: Nova Scotia and New Brunswick, we produced 54 per cent. of the metallic contents of this Dominion. We have up in that country the greatest nickle mines in the world. In fact, a short time ago—less than 15 years ago—we didn't produce over 10 per cent. of the total output of nickle in the world, while to-day we produce a little over 80 per cent. We have the greatest corundum mines in the world, and with Quebec we have the largest and most productive mica mines in the world also. Last year, Coleman produced nine million dollars worth of silver, or one-eighth of the total production of the world. It has produced since 1904 twenty millions of silver, and I might add that last year, if the price of silver had kept up per ounce as it had in 1907, instead of the addition being nine millions it would have been nearly twelve millions on account of the great production there. The cost of silver has been reduced by almost one-third. When you want to make comparisons, Cobalt or Coleman Township alone produced three times what the Yukon did last year, and we have heard a great deal of what the Yukon has produced. Our mining industry has not opened up as fast as I would like to see it, but, thanks to combines, thanks to probably our large production, our neighbors to the south of us are getting their iron mines cornered up so that they are coming in here and investing heavily, and I am satisfied that in the next few years our iron industry will be producing more in dollars and cents than our total mines do to-day. I have often heard the remark made by strangers when I have been going along the C.P.R. and other roads in the North, that this country is only fit for holding the balance of the world together; but when we realize that those rocks are producing something like twenty-six millions a year in this Province, it changes the aspect of things and they look much more pleasant than they would otherwise. We have to-day standing in that north country, owned by the Province and not by any citizen of Ontario, the largest quantity of red and white pine owned by any government in the known world to-day, and it is a great question of how it is best to protect and reproduce that timber. I am glad that the O.A C. is taking up that branch of it, and I think you are taking it up in a businesslike way. The late Government, and we have also followed on, started in by establishing what they called Timber Reserves. We have established a large number also. The largest of these is Nipigon, situated this side of Port Arthur about twenty miles, or at the head of Lake Superior. It contains about 7,300 miles. It has not very much of the red and white pine, but has a great deal of spruce and jack pine. It surrounds one of the most beautiful lakes in the country. It is filled with probably the best trout fishing in the known world to-day, and is a place, even if that timber was not becoming more valuable, which ought to be handled in a different way, because in the reserves, timber will not be sold as it has heretofore by the mile, perpetual license, I might say, but only the trees that have matured and others which have to be taken out. The next largest is the Temagami, which has got one of the most beautiful lakes possible to see, having 2,200 miles of coast around it, and yet in no portion do you seem to get any farther away from the shore than you would in a river, it being filled with islands and bays. The Mississagua Reserve contains the best red and white pine that we have. We have also the Reservation established last year, and we have also the Rondeau Park, in which my good friend, Prof. E. J. Zavitz, is doing me a good turn in going up there and selecting the trees which have arrived at maturity, and we expect to receive some of the money which has been spent in preserving that Park in a very few days. We have also in the northern portion something that has not come into use to a great extent yet, but when you hear as much as you do of the Niagara Power through the Hydro-Electric Commission and one thing and another, you can readily understand what the enormous water falls in that portion of the country will mean to that country as well. It is estimated that there is at least three and a half millions horse power in that Northern Ontario. As Mr .Duff told you, there is in that country also some sixteen million acres of good agricultural land. It has been often stated that pioneering does not pay, but in this age of world-wide markets, in this age of railroading, in this age of crossing the great Atlantic in four days, I think it does, and I think if there is any man going out to hew a home for himself that Northern Ontario offers him as great inducements as it does in the West. Few of you realize that you can get on a train at Toronto and go north 500 miles nearly, and yet be no farther north than Winnipeg, that you will then be 200 miles south of Edmonton and Prince Albert. I am sure that any one of those who went on that trip north in September will tell you that he is more than surprised with what has been accomplished in such a short time. The daylight is much longer than it is here; the growth is much faster than it is here. Some of us can imagine how the pioneers of Wellington County had hardships to endure when they came here to hew out homes for themselves, and had to burn the timber which they cut in order to get rid of it, and when you realize that when you go up there and clear that land there is a market at your very door for every stick you cut of any size at all, when you realize that there is a market for everything you produce there right at your door through mining and railroading and otherwise, it shows the possibilities of our own Province. Mr. Duff says the time may come when Ontario will not be the banner Province she is. I tell you if the citizens of Ontario see their duty as I see it, and open up that vast territory up there, Ontario will always be the banner Province of this fair Dominion. We have standing to-day somewhere about eight billion feet in those reserves; we have something like four billion feet also of red and white pine on Crown Lands which is not in reservations, and if you will multiply that quantity of twelve billion feet by $10 a thousand, you will realize $120,000,000. It has been estimated, and I may say I think it a low estimate at that, that we have over 300,000,000 cords of pulp wood, and that at an estimate of

$1 a cord is $300,000,000 more. We have something like 19,000 acres under license which has been sold at different times from 1870 up to the present day. In fact I might say for the information of some who may not understand, that long before Confederation, the governments of the day did not sell by the thousand feet or by the mile, but gave a permit to cut so much. That went on for a number of years, until finally when the lumbermen went to the Government of the day and said, "We want some other system. The timber which is near the shores of the streams is now nearly all cut. We have to build roads back in from the streams. We have also to improve those streams in order to drive the lumber down to the market, and we want, not a permit for so-many thousand feet, but for so-many millions," and they issued some for twenty, some for thirty, and forty million feet, and I may say that for the famous Gillies Limit there was not one dollar received in bonus, but it was given as a permit and held from that time up to this. In 1872 the Government changed the system again, and they put up the timber by public competition by auction at so-much per million, and they sold all classes and all kinds of timber; and while the license only issued from year to year, and the Government legally could cancel the license any year, yet there would be an unfairness in doing it because of the fact that they have transferred from one to another in so many years that probably the last transfer which has taken place in the last ten years, the purchaser in buying it would pay ten or fifteen and even twenty times as much as the Crown got for it in the first place. Therefore it would be unfair to cancel those licenses without some compensation. But we have in that what will bring the Government in dues—because they pay from a dollar per thousand feet to two dollars per thousand feet when they cut it—equal to five millions more. Therefore in timber alone in that country, we have what we are satisfied is equal to $425,000,000. As I said before with regard to this great clay belt, a man going up there, a man who has got the technical training, a man who can work that soil and employ others—if he has some capital, all the better—the opportunities are so great and the markets are so good, the climate is so good, that it strikes me it is far ahead of the prairie country. I am told, though I never lived on the prairie, that the number of people who go in there is over double of those who live in the backwoods. There is another reason, and I can readily understand it, because I think there is no such company to one who is alone as the trees are. It has abundance of game and fish, and abundance of everything. I would like to say this about technical education, that I hope the time is soon coming that the money will be found, no matter where, by the Province or by the Dominion—and I am glad to say that the Dominion are discussing it and taking it up—that everybody in this Province will be able to receive a technical education no matter what his walk in life may be. Ontario has done a great deal for the agriculturist there is no doubt, and is still spending a great deal of money, but I think it is getting it back tenfold, though I don't think the time has come yet that it realizes what it is getting or that it is getting what it will in the future; because I feel that every year of this College is bringing out better results than was produced by it or by any other college ten years ago, and I feel that your spreading out and getting into every High School in this country from time to time is a great benefit not only to those who are attending there but the neighbours of those who are attending. I am satisfied that no young man can put in four years in these halls and receive the training that they do, and be able to wrap it up in their own souls, but that they must pass it on to their more unfortunate neighbours who are not able to attend here.

ADDRESS.

By Hon. Nelson Monteith, Ex-Minister of Agriculture, Stratford.

Brevity is the soul of wit, therefore I shall be brief. I appreciate, indeed it is a great honor, to have the privilege of again looking into the faces of the students and ex-students of this great institution. As it has been well said here to-night by those who have taken part in the programme, you have a great responsibility, you have high ideals to live up to, to leaven the great mass of humanity which makes up the population of this Province. You have a great responsibility. In fact, I feel that the young men—and I might here say also the young women—should feel almost inflated, as it were, with the importance of citizenship in this great Province. I am glad, indeed, that you have had the privilege to-night to listen to two members of the Cabinet who have my highest respect. The Minister of Lands and Mines is the paymaster to a great extent. He is the man who has largely to get the sinews of war to carry on the work of this institution. I am glad to have had the privilege again of attending the reunion of the students of this institution. I feel that these gentlemen should have been here to-day to fully appreciate what our annual reunion means. It means almost a sympathetic touch of the work carried on from year to year, of recent years at least, upon almost five thousand farms in this Province—work that I believe is making far better work along the lines of cultivation and seed selection and various things which go so largely to make up the large part of the agricultural productions of this Province. As I have said before, you have a great responsibility, and it is now for you to live up to that responsibility, carrying out from these halls the light which Science has borne in upon the wonders of nature. The work which you are doing here, Mr. President, with your staff is going to leaven the whole lump as years go by, and I believe that through the medium of those agricultural representatives that the result is going to be more quickly brought about. I trust that we shall be all spared to come up year after year to carry away from our annual banquet the inspiration which it always gives us in our work upon our farms; because I can speak as one of those who are farming as a business. There is no other profession in the world which brings with it the same independence, if followed with knowledge and that thoughtfulness which this institution is striving to bring to it. I trust that these gentlemen who are with us to-night will go back and tell their colleagues of the good work that is being carried on here. I think almost all the members of the Cabinet have now had an opportunity to come and view this institution and the work it is doing. They are getting a better understanding of the work it is doing, and that is what is wanted among our legislators: a knowledge of the institutions they are called upon to legislate for.

SVALOF.

By C. C. James, Deputy Minister of Agriculture, Toronto.

Six men sat about a table one evening in August last outside of a hotel in the little village of Svalof. They were representatives of five nationalities,— a German student, son of a lawyer, who was spending three or four months at Svalof studying the methods of Farmer Bondesson; a Dutch student interested in botany, studying the methods of seed improvement; the Rector or Headmaster of the Agricultural High School, a graduate of the University of Upsala; Mr. R. B. Greig, the Professor of Agriculture in the University of Aberdeen; Mr. Geo. H. Clark, Canadian Seed Commissioner, Ottawa; and the writer of this paper, representing the Ontario Department of Agriculture. All were interested in agricultural matters, and, although Sweden, Germany, Holland, Great Britain, and Canada were represented, the discussion was carried on in English.

Where is Svalof? What is Svalof? How was it that five students from other countries had come to this little village? What was there to learn? These are some of the questions that I shall try to answer, in part at least, in this paper.

Where is Svalof? We had got our tickets in London at the celebrated Cook's—London to Harwich, Harwich to the Hook of Holland, thence to Rotterdam, Amsterdam, Hamburg, and Copenhagen. We had a ticket also by boat from Copenhagen to Malmo, a port in Southern Sweden. We had a fair idea that if once we reached Malmo, we could find Svalof. That was our hope, for none of us had ever found Svalof on a map of Sweden. It was not until we walked into the railroad station at Malmo that we found a map large enough to carry the name of the little village. It is situated a few miles north of Malmo on the railroad that goes through Gothenburg to Christiania, the capital of Norway. It lies about east of Copenhagen. There is a village of Svalof, but we did not discover it until the second day, as we drove about with Dr. Nilsson to see the great fields of wheat and oats. We then understood why it is not to be found on the maps, for I doubt if it has more than twenty houses. But if places are to be mapped according to their importance, there is no map of Sweden too small to carry the name of this wonderful place, this centre of production of agricultural wealth, the home of the world-renowned Nilsson. When we think of Sweden and her great citizens, such names as Linnaeus the Botanist, Scheele and Berzelius the Chemists, Ericsson the Engineer, Nobel the inventor of dynamite, Nordenskjold and Sven Hedin the explorers, and Jenny Lind the singer may occur to us. But the list would be incomplete without de Laval and Nilsson, the former who gave modern dairying a great uplift, and the latter who has shown how to double, to treble, and to quadruple the yield of grain. It is worth crossing the ocean to shake hands with a man who can grow a field of wheat over 100 acres in extent averaging over 70 bushels to the acre, and it is worth while spending a couple of days investigating how it is done. You are pleased to find that there is no secret about it, and you are surprised to find how simple is the method.

Sweden occupies the eastern part of the Scandinavian peninsula. It is about 1,000 miles long and about 250 miles across at its widest part. It lies between the 55th and 69th parallels of latitude, reaching somewhat into the Arctic circle. The southern part of it lies low, from 100 to 250 feet above the sea level. A large part of central and northern Sweden is mountainous. From these variations in latitude and altitude it will be concluded that it must have great variety of climate and soil conditions. Our investigation deals with the southern part, the district or Province of Skane, which, in many respects, resembles Denmark. Sweden is a little smaller than France or Germany, but about half as large again as the British Isles. It has a total population of 5,200,000. Skane has an area of about 2,500,000 acres with a population of 628,000. When I tell you that 60 per cent. of Skane is arable land or meadow and, though being in area only 1-400 of the entire kingdom, has about 1-8th of the entire population, you will conclude that it must be the most highly cultivated portion of the Kingdom of Sweden. Malmohus, the Lan or district in which Svalof is situated, has 75 per cent. of its entire area cultivated, 5 per cent. in natural meadow, 13 per cent. in woods, and only 7 per cent. in waste or unproductive land.

In all the progressive countries of Europe, as well as in the United States and Ontario, there is a movement citywards. The development of manufacturing and commercialism is causing a decrease in rural population. It is so also in Sweden.

	1870.	1890.	1900.
Agriculture and Fishing.................	72%	61%	55%
Industry (manufacturing, etc.)...........	15%	23%	27%

Sweden is one of the most progressive countries in Europe in regard to agricultural education and investigation. The latest returns available show a total expenditure of 6,800,000 kroner, or $1,836,000, in behalf of agriculture. This is quite liberal and should show good results. When we remember that a large portion of the agricultural area of Southern Sweden is similar to that of Southern Ontario, we might expect to find much in Sweden and her methods that would interest us. In Skane, in Southern Sweden, the peach grows out of doors as with us, apples and other fruits like our own are found there; wheat, rye, barley, oats and sugar beets are staple crops; butter and cheese are produced in factories; pigs are fed for bacon production for the English market—the one crop missing is our corn or maize, but you will find American corn being fed, for the Swedes import it to form part of their ration.

All things considered, I think the farming of Denmark and Southern Sweden is the nearest like that of Ontario of any to be found in Europe, and therefore is specially deserving of our study. It would be impossible in one address to take up all the points of interest. A choice must be made. We have heard much of Denmark and we shall hear more in the future. Sweden, however, has been overlooked. Therefore, I have thought it would be well to direct your attention as students of agriculture to what is being done in that corner of the Scandinavian peninsula lying directly opposite Denmark. You will please keep in mind that, taking the whole round of agricultural work into consideration, I do not place that of Ontario as second to either Denmark or Sweden. We have lines of work superior to theirs; we have greater diversity of productions; we have natural resources of greater extent; we have greater possibilities. The one thing, however, that impresses is the thoroughness with which they have developed the lines they are following and the systematic business-like methods that they have adopted in building up these lines of work: soil improvement, seed improvement, stock improvement, manufacture of products, transportation, marketing and co-operation. The whole people seem to be agreed upon and interested in agricultural development.

One wonders why Sweden is so little known, and why it is not more frequently visited. Tourists and investigators generally stop short at Copenhagen in Denmark. Even agricultural experts from this side of the Atlantic generally turn about at that point and go south into Germany. Therein they make a mistake. Southern Sweden can teach as much as Denmark, and, in regard to seed improvement, I doubt if there is another place in all Europe where you can learn just what can be found out at Svalof. I shall never regret accepting the suggestion of Mr. Clark to accompany him and Prof. Greig, for I set down the two days at Svalof as the most valuable lesson I ever received in information and inspiration.

What is there to be seen at Svalof? Four things. 1st—The Swedish Seed Breeding Institute, conducted under Dr. Hjalman Nilsson. 2nd—The General Swedish Seed Co., Ltd. 3rd—Per Bondesson's Farm. 4th—The Agricultural High School. The Seed Institute and the Seed Company are closely related—they are complementary—the former is the scientific organization, the latter is the commercial.

The Swedish Society for the Improvement of Seeds was organized in 1886 by a few of the farmers near Svalof for the purpose of procuring new varieties of wheat and barley. Systematic selection was the means. In 1888, Dr. Nilsson joined the staff as assistant botanist. He succeeded to the position of Director in 1891. In the five years no outstanding results had been obtained from cross fertilizing and from the usual methods of selection. In 1891, 1,000 new varieties were collected, tabulated, and the seed sown. Two hundred of these were wheat. Permanency of type was looked for. In 1892 the results, as Dr. Nilsson told us, were heterogeneous, negative. A few on careful examination were found to be homogeneous as to height, leaves, length of head, etc. All these, on looking at the records so carefully kept, were found to have been derived from one original plant. In following up this, the next year it was found that out of 422 oat plants, 397 were similar and 25 dissimilar. It was then determined by Dr. Nilsson that the most promising method was to determine new strains from individual plants. I have not time to discuss in detail the method of Nilsson as contrasted or compared with German, English, or United States methods. I would refer those interested to the lectures on Plant Breeding, by Hugo DeVries, published by Kegan Paul, Trench, Trubner & Co., of London, and The Open Court Publishing Co., of Chicago, in 1907. DeVries delivered these lectures in the United States in 1906. They give the best account of Nilsson's work that I know of, in fact the only account in the English language. Professor DeVries makes a noteworthy statement in his book:

> "Under the influence of Nilsson, Burbank and others, the principle of selection has, of late, changed its meaning in practice in the same sense in which it is changing its significance in science by the adoption of the theory of an orgin of species by means of sudden mutations. The method of slow improvement of agricultural varieties by repeated selection is losing its reliability and is being supplanted by the discovery of the high practical value of the elementary species, which may be isolated by a single choice. The appreciation of this principle will, no doubt, soon change the whole aspect of agricultural plant breeding." (Preface.)

Now let us see how Dr. Nilsson works. Walking through his experimental grounds, or through the farming country of Sweden, he finds in a field a single plant of wheat which is an ideal plant, as to roots, stooling, straw, length of head, quality of seed. It is the result of cross-fertilizing in the field. It may be what some would call a "sport," or a derivative therefrom—however it got there, there it is, a superior plant. He would like to perpetuate its kind. The ordinary field of wheat is a heterogeneous mixture of types. He carefully removes that one plant and makes a complete study and record of it. He plants the seed from it and examines every plant produced therefrom. Those that do not correspond exactly with the original model plant in every detail he discards (that is unless there is a promising plant worthy of perpetuating in a new type). The others he records and preserves. Thus he continues, until finally, after five or six years, he has a large field, every plant an exact fac-simile in all particulars of the original plant. He has thus established a type. You look at a field thus produced. It stands like an army of selected soldiers, every individual plant like every other plant. It is now ready for the Commercial Company, to whom its further propagation and distribution are entrusted. And what are the results? We saw wheat that has yielded over 70 bushels to the acre.

Again and again the Doctor was asked as to whether good results could not be got by cross-fertilization, and from the ordinary method of seed selection. "Perhaps so," he said. "We tried it, others tried it, but see my results." And when you look around and see what he has got in the past fifteen years by producing types from individual plants, we see the force of the remarks of DeVries quoted above.

Here let me interject the question, Why cannot as fine results be got in fruit production? There is something that appeals to one in Nilsson's methods: it is so simple in principle, requiring care and observation, a line of work open to the wide-awake, enterprising young farmer. One has only to see a field of standing grain at Svalof to conclude that there they have purified the varieties—there is a similarity, a regularity or definiteness about the varieties that we have not seen before. We conclude that our varieties are to a large extent mixtures of types which require annual selection to keep them up to a high state of production. It has seemed to me that we have corresponding proof of the value of this method in the animal world. Do not the St. Lambert family of Jerseys originate in Mary Anne, and the Morgan race of horses all trace back to Justin Morgan? I never before so fully realized the value of an individual. A single plant produced apparently by chance, but in reality by the fortuitous combination of good qualities, in a single natural production, if properly cared for and propagated, may mean increased national wealth that can be counted only by millions of dollars. Herein we have an argument for the training of men in agriculture, men who can see and who can foresee, and then retained for our own work, not exported. It is the duty of a nation to see that such men are trained, retained, and assisted, and fairly compensated for their work. The discoverer of a Clinton Grape, a McIntosh Red Apple, an Extra-Squarehead Wheat is a national benefactor.

Then, in addition to the method being so simple, the period of development is so short. Dr. Nilsson told us of one case where in only five years' time the product of one head of wheat had passed through the Institute, and through the Company, and was being grown in the sixth generation on the fields of the Swedish farmers. Once the type is established the necessity for annual selection is done away with. The view of those who have carefully studied it is that it will supersede the necessity of extensive work in cross-fertilizing also. Here is what DeVries says in regard to this:

> "The range of variability disclosed by these new studies is simply so wide that it affords all the required material for almost all the selections desirable at present, and will, no doubt, continue to be an inexhaustible source of improvement for a long succession of years. They are founded on the principle of single selections, and the range of application of this method is proven to be so extensive as to make all ideas of repeated or continuous selection simply superfluous. It is even so rich in its productiveness that there is scarcely any room left for other methods of improvement; and especially should all endeavors of winning ameliorated varieties of cereals by means of hybridization simply be left out of consideration, as compared with the immense number of more easily produced novelties which this method offers."

This Svalof Seed Institute is unique. It has experimental grounds covering a little over 40 acres. There is a magnificent building that cost about $80,000. The Institute has an income of about $22,000, one half of which comes from the Government, one quarter from the Agricultural Societies, and the other quarter from the Seed Company and the 800 farmer members of the Institute. Dr. Nilsson is Director, and he has five trained specialists under him, one for barley, peas and vetches; one for wheat and oats; one for clover and grasses; one for rye; and one for potatoes. All are graduates of the University. Two branch stations exist, one at Ultuna for Central Sweden, and the other at Lulea in Northern Sweden. This work is the outcome of the enterprise of the farmers themselves; they originated it, they support it by annual subscriptions, and, when a new building was needed, they donated one quarter of the cost. That is the kind of support that scientific investigation thrives on. Is there not a good lesson for Canadians in the action of the farmers of Sweden?

Next we come to the General Swedish Seed Company. This is the commercial company. It owns 1,500 acres at Svalof and leases large areas elsewhere. Its capital is 800,000 kroner ($216,000). The seed grain is taken from the Institute and increased by sowing. After two years, it is offered for sale. Every bag is examined by the experts of the Institute and nothing is allowed to be sold unless it has the seal of the Institute upon it. Practically all the seed grown in Southern Sweden comes from the Company.

Dr. Nilsson drove us over the big farm, when we saw one field of wheat over 100 acres in extent, Extra Squarehead No. 2, that promised a yield of 70 bushels to the acre and all the product of one original plant. Professor Greig took off his hat and paid his compliments to Swedish agriculture. The Doctor told us that in 1906 a 75-hectare field of wheat yielded 6,300 kilogrammes per hectare by actual measurement. I did some figuring in my note book. A kilogramme is 2.2 lbs.; a hectare is 2.47 acres. Allowing 60 lbs. to the bushel, you will see that means over 94* bushels to the acre. We drove on, in silence for a time, to see a field of oats.

What has been the result? Most of the grain grown in Southern Sweden is from seed produced by the Institute and handled by the Company. Since the work was begun in 1886, the average yields of wheat, rye, oats and barley on the best farms have increased over twofold. The land is nearly all owned by the farmers. There are few tenants. Land adjacent to Svalof is worth 2,000 kroner per hectare, or about $225 an acre.

AVERAGE CROPS, 1886-1895.

	Bushels per Acre. Wheat.	Rye.	Barley.	Oats.
Entire Kingdom..............	22.23	21.54	22.06	19.80
Malmohus	26.6	26.7	27.24	24.37

Thus we see that in the district in which Svalof is situated the average of four grain crops fifteen to twenty years ago was four to five bushels per acre above the average of the entire Kingdom. These are the latest figures available to the writer at the present time. Please keep in mind that we are referring to an area in Southern Sweden which forms but a small fraction of the entire Kingdom. There are large areas where the natural conditions are not at all favorable to intensive agriculture, where primitive methods still prevail. The work of Svalof, however, is extending in influence and no doubt the next decade will see a great increase in the output of agricultural produce.

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* This large yield has attracted some attention, and has never been questioned. The published records for 1906 are not at present available. The experimental yields of Extra Squarehead wheat for 1908 will be found in the appendix to this paper.

One word more before I take you to Bondesson's Farm. The Institute has a large building, well equipped, with accommodation for investigators. You could go there to-morrow and take up the study of plants; a desk would be given you. You would have free access to the museum and records. You would be welcome, there would be no charge, except that you would have to pay your board at the hotel which stands opposite the station. If Maja Johansen is still there she will take good care of you. Even if you cannot speak Swedish, you might be as able to get as good meals and have as enjoyable a time learning Swedish words as did our English party—but that is another story.

The Bondesson Farm. Dr. Nilsson told us that his neighbor farmer, Bondesson, had a good farm. As we strolled about in the evening, we discovered it, and our friend the German student volunteered to introduce us and show us over the farm, for he was there studying Swedish methods of farming. He had spent some months similarly studying agricultural methods in France, Holland and England. He was fitting himself for farming in his native province of Oldenburg. He had a good command of English and I think he profited some from spending a day with us improving his acquaintance with the language. His chief concern at Svalof was in studying the "elevation" of cattle, horses and swine.

Mr. Bondesson is a farmer applying to his 375-acre farm the results that are being worked out by Dr. Nilsson. He is a member of the Lower House or Camera of the Swedish Parliament. He had us register in his visitors' book, then he showed us his agricultural prizes, 188 gold and silver medals, besides numerous other trophies, for he has the prize cattle of Sweden and his farm may be said to be the model farm of Southern Sweden. Then he unlocked a drawer and showed us his decoration, for the King of Sweden has conferred upon him a royal honor in recognition of his agricultural service. He is a Knight of the Order of Vasa. Did you ever hear of a Canadian farmer being knighted?

The property has increased in value, and the operations extended. Some years ago a joint stock company was organized consisting of the father, the five sons, three daughters, and the two sons-in-law. On the farm is a creamery and a cheese factory. There are also belonging to the Company one other creamery and four other cheese factories. The buildings belonging to the Company are insured for $180,000. Here we saw the dairymaids at work making butter and cheese. We saw the piggeries with 2,114 pigs, mostly English Yorkshire, being fed to be made into bacon for the English market. The feeding was being carried out on well-balanced rations, the details being all tabulated so that visitors could see just what was being done. We saw the young calves in isolation under the Bang system, we saw the fields of sugar beets grown for the sugar factory, and the fields of Grenadier and Extra Squarehead wheat. We saw the celebrated stallion Picador, son of the English thoroughbred Isinglass, kept here for the improvement of the stock of the country. We saw the herd of Holland-Friesian cows tethered in a field eating their way through a crop of oats, peas and vetches. I have here a full record of this farm. I shall have to reserve the details for another paper. The herd consists of 50 cows, Holland-Friesian breeding. The highest yearly average was in 1904-5, when it reached 10,406 lbs.;* last year it was 9,460 lbs. The average for the past six years was 9,937 lbs. The milk averaged 3.17 of butter fat during the past three years. The annual wage bill of the farm, 40,000 kroner ($10,800).

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* These are Swedish pounds, add ten per cent. to bring to English pounds.

The week before we were at Svalof, sixty members of the French House of Representatives had come to Svalof to see Dr. Nilsson's work and Per Bondesson's farm. It would pay Canada or the Province of Ontario to send a big delegation just to show how material development can be produced by the application of scientific methods.

But we are not through with Svalof. Our German friend was there studying the methods of raising stock at Bondesson's farm, and our Holland friend was studying plant production under Dr. Nilsson. What about the Swedish Rector, the schoolmaster? As we came down the double line of black and white cows in the pasture field, we reached the road and started for home to test our powers of gesticulation to get another meal. As we walked along the road a large red brick building caught our eye. It stood back from the road, one of a group of four, with lawn and trees in front. Over the door was the word Fridhem,—" House of Peace," said our German guide, " That is a school-house." Dinner could wait; a fine school-house standing by itself out in the country aroused our curiosity. Could we see through it? Our friend went inside, and in a few minutes came out with the Swedish rector. We had found unexpectedly a Rural or Agricultural High School. Introductions followed, and we were shown through. The headmaster apologized for his English; at first it was hesitating, but inside of an hour he was talking quite freely. How superior in the matter of language these European people are to us Canadians: German, Hollander, Swede, all able to speak and read English. The plant consisted of a central red brick building fully equipped for teaching, a large gymnasium, a dormitory, with dining-room for forty students, and a building for tools and outdoor equipment all standing right out in the country. Two acres of garden and orchard were attached to the school. It was by mere chance that we happened along that road on our way home, but our visit to Svalof would have been incomplete without our having seen this rural high school. Gradually our conceit had been oozing out, we were coming into a decided state of humility. This rural school seemed to be a natural complement of the other three features of Svalof.

This school, it should be stated, is not the only teaching institution of the place, for we saw, close to the little village, a fine new public school building that would be a credit to any rural public school section of Ontario. The high school provides two courses. There is a winter term for young men from November 1st to April 15th, consisting of a regular high school branch and an agricultural course; and a summer term for young women from May 1st to July 15th, consisting of a high school course and a household training course. Students admitted to the winter course must be 18 years of age. After completing the theoretical course in agriculture, students to the number of 24 may continue their work in practical agriculture at a farm nearby which is under the direction of an expert farmer. State aid is given to deserving students, and there are two travelling fellowships of 100 kroner each The charges for board and tuition are very light, amounting to about $60.

Girls are admitted from 16 to 20 years of age. The cost of their course is about $45. This school was started in 1895. There are other agricultural high schools in Sweden, the oldest of which was established at Ultuna, in Central Sweden, in 1848. The teaching of agriculture has received attention for many years. As far back as 1740 a chair was established at the University of Upsala for the investigation and teaching of " Rural Affairs and Agriculture." In 1811 the Academy of Agriculture was organized. In 1833 an institute for the teaching of agriculture was established on an estate near Lake Venern. Following this, agricultural schools were established in all parts of the kingdom for the practical training of young men. Following a Royal Commission in 1884, what are called Farmers' Schools have been established, which are usually attached to the People's High Schools, and which give, during the winter months, an elementary instruction in theoretical agriculture. Thus there are three forms of agricultural training, viz.:—

1. The Agricultural Schools (practical).
2. The Farmers' Schools (theoretical).
3. The Agricultural High Schools (similar to that at Svalof).

All these are under the direction of the Royal Board of Agriculture. In addition there are Farriery Schools and Dairy Schools in various provinces. There is no Agricultural College of the scope or having the equipment of the Ontario Agricultural College. It will be seen that the plan worked out in Sweden has been to provide for agricultural instruction at a large number of centres; thus the farmers' sons in Sweden can get instruction in the theory and practice of agriculture without going far from home and at a small expenditure.

Sweden is a large country; she has magnificent resources in her forests, her mines and her water powers. In her soil and climate she is not nearly so fortunate as Ontario, but she has shown great wisdom in the development of her agriculture. Her people are thrifty, intelligent and persevering. They are an attractive people, a most desirable class for colonization. They are well worth studying. They would make most valuable settlers for the new lands of Northern Ontario. From their success in the Northern United States I had expected to find a progressive people in Southern Sweden, but I am free to confess that I had not anticipated such things as we saw at Svalof. One thing in particular impressed me, namely, the initiative, the self-reliance of the farmers. They did not wait for the leading and the paternalism of the Government. They themselves initiated movements to which the Government afterwards gave assistance. There is energy and enterprise in the people themselves—they do things. There is promise in such a people, there is a lesson for the farmers of Ontario in this regard.

I have tried to tell you something of this most successful Seed Institute, which originated with the farmers; of the Seed Company, which is owned and controlled by the farmers; of the model farmer who has grown rich, and who remains a farmer conducting a business of immense proportions; and of the Agricultural High School, where the farmers' sons and daughters can receive a higher education for farm life. You will now perhaps understand me when I say that the two days spent last August at Svalof were days of instruction and inspiration. I can only wish that you also may from this limited statement get some instruction and, what is better, some inspiration.

The Chairman then called on Mr. G. H. Clark, Seed Commissioner, Ottawa,, who had visited Svalof the past summer with Mr. James.

Mr. G. H. Clark: It was an excellent idea to place a representative in agriculture in the various counties It is well that the work of these representatives should not develop too fast, but I am hopeful that within ten years the farmers will have had so much of them that they will demand in all the various counties of Ontario an Agricultural High School equivalent in equipment and staff to the Agricultural High School that we saw at Svalof. I am sure that we can have these Agricultural High Schools when the farmers will appreciate the training that their sons will receive, and we will be closely approaching the time when our people will be raising crops in Ontario equal or almost equal to the best we saw in the lowlands of Scotland and in Southern Sweden.

The farmers of Sweden, with their keen intellect, have learned to apply fertilizers to their advantage. They can discuss with you very intelligently and give you accurately what quantity of fertilizer it will pay us to use on the land for their vegetable crops and root crops, and in some cases for the grain crops. If they can use $10 worth of fertilizer and get $12 worth of crop back, they will use it, not only in Sweden, but in Denmark, Switzerland, and France. I saw commercial fertilizer used to an extent that would amaze our people. It is not for me to recommend the use of fertilizers; the farmer will have to determine for himself to what extent it will pay him to use commercial fertilizers. It is largely owing to a wise use of fertilizers that the people of Europe are able to grow such enormous crops and you can depend upon it, they could not pay the rents if they were not getting yields any greater than we have seen in Ontario.

The system of growing seed in Sweden has now become the system that is adopted throughout Germany, Switzerland, and France. We have in Europe, as well as in America, a great many scientific men who are doing work like Prof. Nilsson, and they have to show something for the money which has been contributed. When I spoke to him about cross-fertilization he illustrated it in this way: "I would do more if I were a rich man; but when we have to consider what we have in our fields and what we have already had prepared for us, we try to improve our crops by individual plants. The selection of individual plants, compared with cross-fertilization is as if I wanted to go to Berlin and I would go to New York first and then back to Berlin, instead of going directly to Berlin." The crops we saw in southern Sweden were ample evidence of the effectiveness of his plan.

EXPERIMENTS ON EXTRA SQUAREHEAD II. IN 1908.

(From the printed records of the Swedish Seed Co., 1909, pp. 12, 13.)

This new seed, which in all probability will be offered on the market as early as next harvest, has, during the year of 1908, been tested by special experiments in conjunction with common Extra Squarehead on a number of farms in our southern provinces, particularly Skane, which province is especially adapted for such experiments.

We are here giving a short summary of the results obtained from all experiments during 1908, in so far as the returns have been made, showing the yields of grain in bushels per acre.

——	Common Extra Squarehead.	Extra Squarehead No. 11.
Malmohus County—		
Bunketofta Morarp	51.6	61.0
Ronnetorf Svalof	41 0	47.0
Utsadesforeningen Svalof	59.2	65.8
Remmarlofs Farm, Eslof	44.9	46.8
Nobbelofs Farm, Lund	58.7	67 0
Alnarf	51.5	61.2
Jordbergal	61.6	70.4
Wemmenhogs Farm, Tofthog	45 3	48.4
Kristianstads County—		
Skottlandshus, Farfof	54.3	67.5
Kalma County—		
Skalby Farm, Kalma	58.5	57.5
Svartingstorp, Lackeby	40.9	25.8
Average of all Experiments in 1908	51.9	56.2
Average in Skane in 1908	52.4	59.4

All the experiments conducted in Skane show that Extra Squarehead II. yields 13 per cent. more than the common. In Kalmar County the Common Extra Squarehead is superior to No. II. The average yield of Extra Squarehead No. II. shows 8 per cent. above the common in all experiments made. At the time of writing, returns from the County of Halland have not yet come to hand.

Extra Squarehead No. II. has been tried at Svalof and Alnarp for three years (1906-1908), during which period the average yield has been respectively 17 and 18 per cent. higher than common Extra Squarehead. On very large areas at Svalof the new seed yielded 3,550 kg. per hectare during 1908; common Extra Squarehead yielded under the same conditions 3,150 kg.—a difference of 13 per cent.

Comparisons between common Extra Squarehead and Extra Squarehead No. II. in the Province of Skane all point in the same direction in nearly every case. From the results now obtained it is reasonable to expect that Extra Squarehead No. II will yield several bushels more per acre than the common, a difference which must be considered of the greatest value. It may be added that the new seed is somewhat heavier and shorter in the straw than the common, which it, however, resembles very much.

(Sgd.) H. Nilsson-Ehle.

FROM OFFICIAL SWEDISH STATISTICS.

Crops in Sweden in 1907.

	Acres.	Yield Bushels.
Wheat, winter	201,426	5,750,672
" spring	15,376	334,380
Barley	486,780	12,415,424
Oats	2,001,945	62,600,376
Rye, winter	983,431	20,929,488
" spring	22,047	391,552
Mixed grain	374,803	13,044,544
Beans	11,241	164,584
Peas	48,135	797,976
Total	4,145,184	116,428,896

Live Stock in Sweden.

	1890.	1900.	1907.
Cows	1,578,927	1,764,819	1,804,473
Other cattle	820,564	817,736	824,509
Sheep	1,350,804	1,261,493	1,021,727
Goats	86,980	79,826	65,798
Swine	644,861	805,805	878,828
Horses	487,429	533,050	566,227
Reindeer	296,220	231,960	235,600
Poultry	1,414,016	2,310,001	3,691,439

PER BONDESSON'S FARM, SVALOF, SWEDEN.

(Translated by Mr. J. F. Hansen.)

I.—GENERAL.

Per Bondesson's Farm Company, of Svalof, Sweden, was registered in the year 1898, with the object of purchasing and carrying on the farm dairy and cheese manufactory belonging to Mr. Per Bondesson, member of the Swedish Legislature, and acquired by the latter 22 years previously. The capital of the Company amounts to 320,000 kroner, and the shares are held by members of Mr. Bondesson's family. The registered office is at Svalof.

The Directors of the Company are:—

Chairman and Managing Director Mr. Per Bondesson, Knight of the Order of Vasa.
Bonde Bondesson, Civil Engineer, Ostra Carlnas, nr. Svalof.
T. Akesson, Treasurer, Wallenborg near Svalof.

The Company own the land known as No. 8 and No. 3 in the Parish of Svalof, and No. 5 in the Parish of Felestad.

The property is assessed for taxation at 180,000 kroner, and consists of 150 ha.* of arable land, clay soil, with clay subsoil, which is drained and in good cultivatable condition. The buildings are insured for 673,640 kroner. The Dairy and Cheese Manufactory was started in 1876. Originally these were carried on in a small way, but increased from year to year till 1890. Since that year no extension has taken place.

The Creamery at Kagerod, also belonging to the Company, has been carried on since 1886. Cheese factories were added in 1890 at Grylevad per Astorp, at Strofvelstorp per Hasslarp, at Walo per Wallakra, and Horby per Horby. The turnover for the year 1907 was as follows:—

Number of Milk Sellers, about	400
Fresh Milk received	7,834,691 kg.
Skimmed Milk supplied to Cheese Factory	6,935,000 kg.
Butter manufactured	228,396 kg.
Cheese manufactured (milk cheese) at Svalof	365,390 kg.
Cheese made at branches (Margarine Cheese)	603,171 kg.

The grades of cheese manufactured are 1-1, 1-3, 3-4, 1-2, 1-4 (cream cheese) skimmed milk cheese and margarine cheese.

In conjunction with the dairy, extensive raising of hogs is carried on, consisting partly of raising breeding stock, viz., "large white English" (Yorkshire), and partly of generally raising and fattening for sale to packing houses. Of the latter type, there have been raised per annum, on an average, at the following depots:—

At Svalof, about 3,000. At Wallakra, 600. At Astorp, 350.

The total stock of hogs amounts at present to:—

At Svalof, Breeding Stock	100
Ordinary Stock	1,400
At Wallakra, Ordinary Stock	350
At Astorp, Ordinary Stock	175

The Cheese Factory at Horby supplies whey to the Milk Sugar Factory at that place. The farm sells a large quantity of breeding animals, viz., cattle of the East Friesian and hogs of the Yorkshire type. This breeding stock is exported to all parts of Sweden, Denmark, Norway, Finland, Germany and Austria.

The Company has received, since 1881, about 150 medals and diplomas at various exhibitions; 125 of these have been obtained since 1891.

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1 ha. (hectare) = 2½ acres; 1 kg. (kilogram) = 2.20 lbs.; 1 kroner = 26 to 27 cents.

II.—Raising of Cereals.

The acreage has been divided into eight units, consisting of 18 ha. each. These units are being cultivated in the following rotation:—

1. Wheat.
2. Turnips and potatoes.
3. Barley.
4. Green feed.
5. Wheat.
6. Oats.
7. Clover and grass.
8. Clover and grass.

Note.—The following information is given as to seeding:—

1. *Wheat.*

Of wheat, partly the "Grenadier" variety and partly the "Extra Squarehead" is being raised. The seeding quantity amounts to 180-200 kg. per ha. The soil receives 20 loads of stable manure and 200 kg. of 20 per cent. biphosphate per ha. In the spring the field is being harrowed and rolled, and, if necessary, Chile saltpetre is afterwards applied.

2. *Turnips and potatoes.*

As a rule 10 ha. are planted with sugar beets and 7 ha. with turnips, and the balance with potatoes. The acreage, so far as it is covered with stubbles, is being ploughed when opportunity is given with a breaking plough, and manured with 15-20 loads of stable manure per ha. In the spring 150-175 kg. of 20 per cent. biphosphate, 100 kg. of 37 per cent. potash, and, shortly before the planting of the beets, 50 kg. of Chile saltpetre is applied. Afterwards further quantities of 50 kg. Chile saltpetre are twice applied.

Of turnips, only the following varieties are being raised:—

Des Barres, Eckendorfer and Light Red Sugar Beets; for these varieties the soil need not be so well manured. During the last few years pease have been sown on 2-3 ha. where formerly beets were placed, as a difficulty is being experienced in obtaining hands for the best cultivation.

3. *Barley.*

The "Prinzess" variety is being used. This variety does not require any manure. The quantity seeded is 150 kg. per ha. In the fall and after the harvest the soil is half-manured in preparation for the following year.

4. *Green Feed.*

As a rule an early maturing variety of peas is sown on part of the land; the remainder receives ordinary green feed, which serves for cattle grazing. The mixture consists of two-thirds peas and vetches and one-third oats. The quantity sown amounts to 250 to 280 kg. per ha. The seeding is performed at three different times, which creates the advantage of letting the cattle graze off it successively. After the grazing the land is ploughed at a depth of 20 to 25 cms., and manured with 200 kg. of 20 per cent. biphosphate.

5. *Wheat.*

Qualities of wheat applied here are the same as under No. 1, the amount seeded being 180-200 kg. per ha.

6. *Oats.*

The soil is manured in the spring with 125-150 kg. of 20 per cent. biphosphate. This manuring benefits not only the oats, but also the clover and grass during the year following. The quantity of oats sown is 150-160 kg. per ha.

7. *Grass and Clover.*

The acreage is now kept in grass for two years, and the following mixture of seed is used:—

Silesian and Swedish Red Clover 8 kg., Alfalfa 3 kg., Alsike Clover 2 kg., White Clover 0.5 kg.

Cocks-foot grass	3	kg.	per ha.
Meadow grass	12.5	"	"
Timothy grass	2	"	"
French Ray grass	4	"	"
Cockle grass	1	"	"
English Ray grass	2	"	"

Grazing is not commenced until after the hay has been saved, viz., in August and September.

8. *Grass and Clover* (second year).

Fourteen days after the hay crop has been got in the young cattle are, in the second year, turned out to graze, and afterwards the land is manured and prepared for wheat. The land is being worked with appliances according to requirements. In the spring a light harrow is generally applied, after which the drill is used. All seeding is done by Melichar seeding machines. In the fall the stubbles are broken in depths of 20-25 cm. The fields containing either wheat or grass seed are rolled in the spring, and, when necessary, the wheat fields are also harrowed over again. If possible, all cutting is done by mowers and self-binders. The grass is cut with grass mowers, and hay is turned by hay-making machinery.

III.—Horses.

The 16 horses which are working on the farm are partly thoroughbred Ardenne and Clydesdale, partly half-blood. There are also several mares, of which one is a thoroughbred English, and a few English half-blood; also a thoroughbred English stallion, "Picador." The latter is descended from the world-famous stallion "Isinglass," which won at various races, during two years, 1,442,700 kroner. "Picador" holds a record of being the second English racer, namely:—

1,609 metres in 101 seconds. At the Horse Show at Malmo, in 1906, he received a special diploma from the "Swedish Feltridt Club." This stallion's covering fee is 25 kroner. The number of mares put to this stallion has increased from year to year, and amounted, in 1907, to 66.

IV.—Cattle.

Eight years ago the whole of the stock of cattle consisted of Shorthorn, but since then it has been entirely replaced. All Shorthorns were sold, and the whole of the present stock consists of East Friesian cattle. The first 13 cows of this breed were purchased in the spring of 1900 by auction from Farmer C. Mage, of Borreby: subsequently two consignments were imported direct from West Friesland. There are now 4 older and 12 younger bulls, 52 cows, 18 two-year-old and 15 one-year-old heifers, and 18 calves. It is considered that the stock of the farm is one of the best in either Friesland or Sweden. The older animals above referred to are all descendants from the old "Gallus" (77). The imported animals are selected and of good pedigree, have a good appearance and excellent milk-yielding qualities. They have been only once to an exhibition, which was at Norrkoping, in 1906, when five cows and a bull, "Baron" (1305) received a first prize. The judgment of the committee read as follows:—

" Special fine, robust and pure collection—a collection of five heifers and one bull " Onno " (1831)—were exhibited on this occasion and received the second prize."

The committee stated these excellent imported heifers had not received the prize owing to the absence of evidence as to the original pedigree and full details. The bull " Baron " was again exhibited in the spring of 1907, with 22 descendants, and received first prize.

In addition to the stock mentioned above a bull named "Allan," aged 6 years, has been acquired for the price of 4,000 kroner. In addition there is a young bull named "Mazeppa," (4) which received a first prize. The sale of breeding animals takes place three times a year at auction sales at Malmo, and partly privately. Altogether some 30 bulls have been sold at fairly high prices so far. The highest price obtained up to the present time is 3,010 kroner for the young bull "Baron dal," descended from Baron (1305) also from "Dalia" (3747) which was acquired by the Association of Breeders at Dagstorp. The mother of this bull had, during 6 years, an average yield of milk amounting to 5,955 kg., with 3.2 per cent. of fat.

During the summer of 1907 a new stable was built for the young cattle which did not react to the tuberculin test. It is intended to raise gradually a complete stock of cattle which have not reacted to the test.

The artificial food for the cows is composed of 30 per cent. of bran and 70 per cent. of oil-seed cakes: the quantity of cake and bran fodder given is calculated upon the milk result of the cows, viz.: for a cow yielding 6 kg. of milk 1 kg. of fodder, for a yield of from 6 to 12 kg. milk 2 kg., for a yield of from 12 to 18 kg. 3 kg. of fodder, from 18 to 24 kg. 4 kg. fodder, and for larger yields 5 kg. Hay is given in quantities of 2 to 4 kg., and straw according to requirements. In the fall and during the winter turnips are supplied so long as there is any stock left, and later slices of turnips are given. The calves receive milk during the first five or six months and also linseed cake, crushed oats, turnips cut up, hay, etc. Older and growing bulls are given exercise, if possible, once daily, and cows once weekly. The result of the milk yield during the last few years can be observed from the figures given below.

ANNUAL RESULTS.

Year.	Total Fodder Units.	Kilograms Milk	Kilograms Butter-Fat.	Fat Percentage.	Kilograms Butter.	100 Fodder Units produced.			Price Received.		Number of Cows.
						Kilograms Milk.	Kilograms Butter.	Value.	For kg. Milk.	For kg. Butter.	
								kr.	kr.	kr.	
1900–01..........	2,406	3,191	94.98	2.99	104.60	132.7	4.36	.....	6.76	1.91	5.0
1901–02...........	2,511	3,746	110.80	2.96	121.60	149.2	4.82	......	.....	....	8.2
1902–03...........	2,607	4,578	134.50	3.08	148 00	167.3	5.08	....	.....	.....	12.13
1903–04...........	2,673	4,363	142.49	3.11	156.95	171.3	5.87	11.48	5.3	1.39	18.50
1904–05...........	2,925	4,730	144.50	3.05	158.46	161.7	5.42	10.56	6.2	1.71	21.06
1905–06...........	2,855	4,468	141.35	3.16	155.47	156.5	5.45	11 19	6.6	1.75	40.13
1906–07...........	2,791	4,613	147.27	3.19	162.39	165.3	5.82	12.41	5.9	1.55	50.6
1907–08...........	2,692	4,300	135.81	3.16	149.64	159.7	5.56	11.72	5.6	1.52	52.2

V. Hogs.

The raising of hogs has been carried on since about 30 years ago, when it first became necessary to increase the quantity of hogs raised, owing to the increase in the dairy business, and the necessity of turning the by-products from the manufacture of cheese and butter into use.

The hogs raised originally were of a common local breed and the bacon was not of a good quality. Later, when the dairy business increased, it became necessary to acquire a quick-growing variety of hog which, at the same time, gave better yield in weight. Trials were made with various breeds, for instance Berkshire, Tamworth, Poland China, Yorkshire and others. It became clear from the first that the Yorkshire variety was better than any of the others. In 1883 a boar was purchased, which had been imported by the Alnarp Agricultural Society. Later a purchase of boars and sows was made direct from England, the home of this breed, and at present the whole of the breeding stock in hogs consists of pure Yorkshires. or the large white English variety. The breeding stock consists now of 4 older and 7 younger boars, also 25 growing ones, 48 older and 19 younger sows, altogether about 100. In addition to this breeding stock there is a stock of hogs amounting to 1,400. The hogs raised for sale are recruited from such animals as do not prove suitable for breeding purposes, and the remainder are purchased from small farmers in the district. In order to keep a pure stock it has been decided to keep all breeding boars and mother cows with the farmers who sell milk to the Company. The sows are given out on the condition that the Company can always obtain the sucking pigs at the current day's price. The latter, up to a weight of 15 kg., are sold at a fixed rate: for all others the current weekly prices are paid.

The principle has been laid down to breed, so far as possible, a variety which is suited for the climate, and also quick-growing, and which develops an abundant quantity of bacon, and this breeds numerously and yields an ample quantity of milk for the sucking pigs.

The Svalof breeding stock, which has occupied the front rank in Sweden during the last 20 years, has been able to maintain this position. This is proved by the numerous prizes and diplomas conferred upon this stock since 1891. The following prizes have been awarded:

At Gothenberg, 1891, 14 prizes in respect of 14 exhibits.
In Ystad, 1893, 9 prizes for 9 exhibits.
In Malmo, 1896, 16 prizes for 23 exhibits.
In Kristianstad, 1899, 12 prizes for 12 exhibits.
In Gefle, 1901, 11 prizes for 12 exhibits.
Helsenberg, 1903, 10 prizes for 16 exhibits.
Norrkoping, 1906, 18 prizes for 18 exhibits.

And besides various diplomas, a gold medal at Gothenberg in 1891, and Norrkoping in 1906. Further hogs which were bought at Svalof received 12 prizes, of which the two first ones were conferred on the older breeding boars and two upon the older sows at an exhibition at Odensee, Denmark.

The fodder for the mother sows is composed of two-thirds of mixed grain crushed, and one-third of bran. Quantity 325 kg. during the sucking time and one to two kg. previously. In the summer and fall they are given also alfalfa, in the winter and spring turnips. In drinking they receive clear water. Older and also growing boars receive fodder consisting of mixed grain crushed, and crushed oats. They also receive some wheat refuse and some green feed.

The young sows which are intended for breeding purposes are raised on the same fodder as the older ones, with the difference that crushed barley is substituted occasionally for bran. At the time the pigs are turned out on the stubbles they receive less cake and bran fodder and sometimes only dairy refuse. The feeding of the sows when quite young is of great importance, and the following is the procedure:

Feeding is generally commenced when 14 days old. For the first week they receive whole wheat or barley, fresh water, and in a separate trough. Later they receive, for several weeks, some fresh milk and gradually one proceeds to feeding them with skimmed milk or butter milk, and in 6 or 7 weeks they are taken away from the sow and can go on by themselves. Whole wheat is gradually ceased and mixed grain or crushed barley given. It is of importance that only fresh fodder is given to them, sour milk or old or moulded grain must be avoided. In order to keep a strong frame lime-containing substances, such as shells, bone meal, charcoal, etc., are supplied. In order to keep exact control a careful register has been kept since 1891, and the various animals are given numbers. For instance, when the pigs are 10-20 days old they are marked, and a special book is kept. In this book is also kept an account of the various sows, so that the result yielded from each of them can be seen. Later the young sows which are intended for breeding are marked with an aluminum button on their ears, which on the reverse contains the number in the book. The breeding boars are numbered and a special register is kept respecting them. When sold, the purchaser has an extract from the Stock Register giving the date of birth and the mark, name and number of the parent.

It has been arranged for the favorable thriving of these animals that during good weather they are turned into the enclosure adjoining the sties.

The feeding of the hogs for sale is based principally upon dairy refuse. The selection of artificial fodder, such as seed-cake, is to a large extent based upon the varying prices of these commodities. The price of hogs also must be taken into consideration, but as a basis for the composition of artificial foods, the following can be accepted:

In the morning one-half crushed mixed grain is used and half flour, etc. In the afternoon a mixture is given consisting of maize, or maize meal, barley-bran and mill refuse, also a little warm water and whey. This mixture, prior to being used, is placed out for 30 hours for cooling and fermenting. The fodder is at both times given separately, and the milk is not admitted until after the food has been eaten. The quantity of fodder given amounts to about 1 kg. to each hog, and in this way a smaller one receives a half kg. and the larger ones 2-2½ kg. As the hogs develop the quantity of food given increases and gradually the younger animals receive the skimmed milk, while the older ones receive the whey.

Any young pigs purchased from outside are carefully watched during the first period, in order to avoid their receiving too much liquid, which may have unsatisfactory consequences. In order to keep their frames in good condition they are given bone-meal, shells, charcoal and gravel until they have a weight of 60 kg. They are turned out every day into the enclosures. Last year some 2,700 hogs were sold and the prices were calculated according to the weight on delivery. Most of the hogs are now sold to the export packing house at Landskrona. There are eight men in charge of the Company's pig-sties.

Crushing of the seed-cake, etc., is done with the assistance of the dairy steam power. A large number of breeding pigs are sold, not only to this country, but also to Denmark, Finland, Germany and Austria. The farm can always supply breeding pigs and will be pleased to supply price lists and further particulars on application.

VI. The Dairy.

The Dairy consists of the butter and cheese department and is carried on partly in Svalof and partly at the branches at Wallakra, Horby, Astorp, Stafrelstorp. and Kagerod.

The number of milk sellers amounts to 400 and the amount of milk weighed in at Svalof amounted in 1907 to 7,834,691 kg., of which 228,396 kg. of butter were manufactured. Approximately half of this butter was sent to England by the Swedish Butter Export Association, the balance was partly sold back to the milk sellers and to co-operative societies at Billeshalm, Hàganàs, Ekeby, Furnlund, etc.

During the last year 4,358,000 kg. of fresh milk were used for cheese manufacture.

The following grades are being made here: 1/1, 3/4, 1/2, 1/4, cream cheese and skimmed milk cheese.

Only margarine is made at the branches, and the skimmed milk for this purpose is bought at another dairy in the district where these branches are situated.

At Kagerod the Company has also a creamery.

The daily quantity of milk received in Svalof amounts sometimes to as much as 30,000 kg., and cheese is made at the various depots from some 20,000 kg. milk per day. The sale of cheese is conducted partly from Svalof and partly at the branch depot at Stockholm, the Company's cheese being purchased in all parts of this country.

The dairy of Svalof is quite up-to-date, considerable improvements having taken place, all the machinery is of the newest and best construction, and in connection with the making of butter, ice and cooling machines are being used.

The premises are lighted by acetylene gas.

In the various dairies the Farm employs 5 male and 5 female dairy assistants and 3 junior assistants, 4 mechanics and 20 apprentices; altogether 37 people. The whole of the stuff are insured against accidents. The Farm produces in all the following quantities of provisions per day, being a quantity sufficient to supply a city of 20,000 to 25,000 inhabitants:

7,000 kg. butter.
1,000 kg. milk cheese.
1,700 kg. Margarine cheese.
800 kg. Bacon.

THE HIGH SCHOOL AND AGRICULTURAL SCHOOL, FRIDHAM. SVALOF, SWEDEN.

The High School and Agricultural College at Svalof is situated near the railroad station of the West Cost Railway in the parish of Svalof, Province of Malmo.

The buildings of this institution are valued at 70,000 kroner. The oldest were erected in 1895, the remainder during the years 1899, 1901 and 1907. They include two large and well ventilated lecture halls, with library and cloakrooms. There is also a large gymnasium with modern equipment. In a separate building are the living apartments of the students, masters' and matron's apartments, dining rooms, and in all 20 light and well fitted up bedrooms with accommodation for two students in each room.

All arrangements in connection with the institution are in accordance with modern requirements, and it may be regarded as one of the best in the country.

The programme of the school includes:

1. A winter term for young men from 1st November to 15th April, consisting of a High School Branch and an Agricultural College Branch.

2. A summer term for young women from the 1st May to 21st July, consisting of a High School and household training branch.

HIGH SCHOOL DEPARTMENT.

The object of this department is to give young men practical general instruction to fit them for any duties in civil life. The instruction consists of lessons in Grammar, History, Geography, Local Government, Constitutional Instruction, Chemistry, Physical and Natural History, Arithmetic, Writing, Book-keeping, Surveying, Weighing, Riding, and daily practice in Gymnasiums. There is no entrance examination necessary in this Branch, but it is a condition that students be not less than 18 years old, as a student would otherwise fail to profit by the instruction given, and a student under that age would not be eligible for receipt of State support. (See below.)

AGRICULTURAL DEPARTMENT.

The object of this Department is to impart general agricultural knowledge and principally to give the students a theoretical instruction in agriculture.

Secondary instruction is given in Grammar, History, and Geography, methods of Local Administration, Arithmetic, Hygiene, but principally the training comprises instruction in Chemistry, Botany, Zoology, Agriculture, Veterinary Science, Dairy work, Forestry, Gardening, Farm Management, Riding, Surveying, Weighing, Chemical experiments in milk testing (to train milk control officers). In addition, instruction is given jointly wth the High School in singing and gymnastics, daily.

For those who desire to continue practical training in agriculture after having finished their term and passed an examination, it is arranged that they shall receive a position as paid assistant on the farm called Belteberga (Province of Malmo) from 24th April to 24th October, where they will receive further practical instruction in accordance with arrangements made by the College with Mr. Aug. Kimp, the owner of this property, as to the work to be performed. There are one or two travelling scholarships, of 100 kroner each, which will enable recipients to obtain additional instruction or some other instruction and to otherwise increase his knowledge.

In all, not more than 24 students are received in this Branch each term.

From the Royal order issued by H. M. the King, respecting the Agricultural College at Fridham, dated Stockholm Castle, on the 28th February, 1900, the following extract has been made:

CONDITIONS OF ENTRY FOR STUDENTS WHO DESIRE TO ENTER THE AGRICULTURAL COLLEGE.

The following conditions have to be complied with:

(*a*) The student must be 19 years old, of good character, and he must have had at least one year's practical knowledge of the agricultural work, also have a knowledge of the Swedish language and be able to read, and write from dictation without mistakes.

(*b*) Able to write clearly.

(*c*) Firm in Arithmetic, including fractions.

(*d*) He must have an elementary knowledge of Geometry and of surveying.

(*e*) In Natural History, he must have an elementary knowledge of the principle, physical and chemical rules and of the build, etc., of the human body.

(*f*) Bookkeeping, he must have some knowledge of ordinary principles.

3. Such students need not undergo an entrance examination if they have passed through the State-supported High School, or any similar institution which imparts a good knowledge of the Swedish language, mathematics, and natural history. and of the other subjects stated in paragraph 2 of these conditions as required from any student entering the Agricultural College.

The following payments have to be made:

50 kroner as a school fee. This fee will not be charged to students who have passed a satisfactory entrance examination and prove to be of very moderate means.

In the Agricultural College at least three students are exempted from payment of this fee. Students of small means or without means can, in addition, receive a State support of 50 kroner. One or two students may receive from the Agricultural College a travelling scholarship of 100 kroner each, (see above).

A further sum of 50 kroner for each term for apartments. The rooms are furnished with bed and mattress, chest of drawers, table, chairs, lamp, and wardrobe. and are heated, and the price is the same whether a student shares his room with a friend or occupies it alone.

Arrangements must be made with the matron as to payment for cleaning rooms.

The whole cost of meals at the school amounts to 1 kroner per day if contracted for for the whole term. The price of a single dinner is 0.60 kroner. The total cost for single day is 1.25 kroner.

Books and papers can be obtained from local booksellers.

It is advisable to bring bed linen and pillows from home. For students who do not desire to receive board and apartments of the school, the charge for instruction is made similar to above, but no charge would be made for heating, etc.

It is advisable that students live at the school, at all events until accommodation is filled.

Applications are received on the 15th of October at latest.

The conclusion of the term in the High School takes place without examination, but in the Agricultural College there is a public examination.

The students of the High School, who have by good conduct and industry made satisfactory progress in the school, can always rely upon receiving recommendation from the head of the school in the event of seeking employment.

SUMMER TERM.

THE GIRLS' HIGH SCHOOL AND INSTRUCTION IN HOUSEHOLD AFFAIRS, FROM 1st MAY TILL 31ST JULY.

The aim of the school is the same as stated for the winter term, namely, to be a training college to instruct young people in all branches which are useful, in order to fulfil duties that may later be imposed upon them. The subjects of instruction include those of the winter term, except that they are shorter than those given to the young men.

In the case of Natural Science and Natural History, special care is taken to give instruction in such matters as it is especially important for the head of the household to know. Bookkeeping is also confined to household bookkeeping. Hygiene is taught extensively. There are daily gymnasiums. Sewing instruction includes:

1. Instruction in needlework and mending.
2. All sorts of hemming, sewing, button-making, embroidery, lace making, etc.
3. Weaving and all kinds of old Swedish textile crafts.

As all higher grades of the last mentioned crafts are taught, it is expected that students possess all elementary knowledge of same.

It is not necessary to supply material, cotton, silks, etc., which will be supplied by the school and need not be brought from home. There is no entrance examination. The age of a student must not be less than 16, younger girls are, as a rule, not admitted. The highest age for admission is 20 years.

The household school aims at training students to become careful and sound home managers and is arranged under a system similar to the corresponding winter agricultural school.

Conditions for this branch are that students must be at least 18 years old and also that they must have been employed in housework and passed through the High School.

They must also be able to read well and to write down from dictation without mistakes and they must be able to write short essays, also know elementary arithmetic, fractions and decimals.

In addition, students must also be able to do ordinary needlework.

Instruction in the household school embraces careful teaching in elementary chemistry and natural history, having special regard to all natural forces which have an influence upon the household management.

Instruction in our method of food preparation, composition of meals, etc., home hygiene, instruction respecting furniture and household supplies, gardening and poultry, bookkeeping and expense in housekeeping, arithmetic, singing and daily gymnastics.

The term concludes with a public examination and the issuing of certificates for those students who obtain and apply for same. Free scholarships are given to students with small means.

Support by the State is given to the extent of 200 to 300 kroner per year to students without means.

The fees to be paid by the student amount to 30 kroner and apartments are charged for at the rate of 30 kroner for the term.

The cost of meals per day is the same as in the winter term. As regards linen, etc., the same conditions as above apply.

From 10 to 20 kroner must be paid for material required by students, but any needlework, etc., done by the students remains their property.

Applicants must apply before 15th April. No more than 32 students are received in each term.

Subjects and order of hours are fixed by the headmaster, but in case of students attending a second term they are free to apply for instruction in any subject in which they did not become efficient during the first term.

Written applications must be sent to the headmaster at Svalof in good time and not later than above stated. Enquiries respecting the school are replied to by return of post. Applications are immediately answered as to whether a student can be accepted for the next term or not. It may be pointed out that Svalof is, in many respects, one of our country's most noted places.

Prof. Zavitz: Before closing, I wish to say how very much indeed we appreciate the addresses from Prof. James and Mr. Clark. It was not only an inspiration to these gentlemen who had the pleasure of visiting Sweden, but it has been a great inspiration to us to hear them tell of the excellent work conducted in Sweden regarding which we have read in the past. While Prof. James was speaking, I could not help thinking of somewhat similar lines of work which have been carried on in Ontario. Take for instance, the Dawson's Golden Chaff winter wheat that was originated by selection by Robert Dawson at his home about twenty-five miles south of here. In a field of White Clawson wheat, one plant stood up better than all the rest which was badly lodged, and he selected that plant. From that one plant, a new and distinct variety was developed which is now grown very extensively. The Imperial Amber variety of winter wheat was selected in the Province of Ontario and it now stands the highest in yield per acre of all the varieties of red winter wheat which we have under test. These illustrations go to show the opportunity of doing excellent work in the selection of our grains on the farms of Ontario. Then you will remember that the O.A.C. Number 21 Barley, which has given such excellent results over Ontario in the last three years, originated here at the College from one selected plant. We have several other very promising selected strains and new hybrids of our leading classes of farm cereals. I believe the time has come when we can develop more and more this line of work at the College to the great advantage of all concerned. We are greatly indebted to these gentlemen for their very helpful suggestions.

RESOLUTION

The following resolution was presented by Prof. C. A. Zavitz:

I believe it is the consensus of opinion that, owing to the number of meetings that are being held at this time of the year, compelling us to commence our meetings on Monday afternoon at two o'clock, when it is practically impossible for many of the members to be present at the meeting, it would be advisable to change the date of the Annual Meeting of the Experimental Union until some time in January. Perhaps a good time for the meeting would be either at the beginning or at the close of the short courses, when there are not so many meetings or so much going on. Therefore, I move "That in the opinion of the members of the Experimental Union the executive should take into their consideration the advisability of holding the Annual Meeting next year at some other than the usual date, in order to give the members a better opportunity to attend the meeting."

The motion was seconded by J. O. Laird and carried by the meeting.

ANNUAL REPORTS

OF THE

Dairymen's Associations

OF THE

PROVINCE OF ONTARIO

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF
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1910

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TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., *etc., etc., etc.,*
Lieutenant-Governor of the Province of Ontario.

May it Please your Honour:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Dairymen's Association of Western Ontario for 1909, and the Report of the Dairymen's Association of Eastern Ontario for 1909

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

CONTENTS.

Page.
LIST OF OFFICERS 5, 6
FINANCIAL STATEMENTS 5, 6

DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO:
- President's Address: JOHN R. DARGAVEL, M.P.P. 7
- Address: SENATOR DANIEL DERBYSHIRE 9
- Resolutions 12
- Committees 13
- Production of Cheap Milk: HENRY GLENDINING 14
- Problems of the Dairymen: G. A. PUTNAM 20
- Another Year in Cow Testing: CHAS. F. WHITLEY 24
- Dairy Education: Dr. C. A. PUBLOW 32
- Address: C. C. JAMES 35
- Further Experiments on the Care of Milk for Cheesemaking: GEO. H. BARR.. 42
- Report of Chief Dairy Instructor and Sanitary Inspector: G. G. PUBLOW 51
- Dairy Bacteriology: W. T. CONNELL 60
- Creamery Work in Eastern Ontario: F. SINGLETON 66
- A Cheese Merchant's Advice: H. H. HODGSON 69
- Some Things We Need: Dr. C. A. PUBLOW 73
- Co-operation in Agricultural Education: G. C. CREELMAN 77
- Address: Hon. J. S. DUFF 82
- Presentation to John R. Dargavel, M.P.P. 89
- Rough Forage for Dairy Cattle: J. H. GRISDALE 90
- Secretary's Report: R. G. MURPHY 99
- Resolutions 100
- Auditors' Report 101
- Discussion upon Cheesemaking 102

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO:
- President's Address: J. J. PARSONS 104
- Directors' Report 105
- Report of Committee upon the Dairy Herd Competition: FRANK HERNS..... 107
- Value of Cow Testing Associations: N. P. HULL 110
- Commercial Feeding Stuffs Act: R. HARCOURT 117
- Dairying for Profit: N. P. HULL 123
- Address: JOHN R. DARGAVEL, M.P.P. 130
- Address: C. C. JAMES 132
- Report of Competitions in Cheese and Butter 137
- Report of Instruction in Cheese Factories: FRANK HERNS 140
- A Study of Yeasts in Whey: S. F. EDWARDS 147
- Address: G. G. PUBLOW 152
- Instruction at Creameries 157
- Creamery Problems: H. H. DEAN 159
- Is the Canadian Cheese Trade in Danger? J. A. RUDDICK 161
- Origin of the Dairy Farm Competition: H. B. COWAN 173
- Address: GEORGE A. PUTNAM 177
- Sanitary Milk: FINDLAY G. MCGREGOR, M.P.P. 182
- Resolutions 188

DAIRY SCHOOL AT AGRICULTURAL COLLEGE, GUELPH 189
EASTERN DAIRY SCHOOL, KINGSTON 192

DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO.

OFFICERS FOR 1910.

Hon. President—Senator D. Derbyshire, Brockville, Ont. } Both for life.
" J. R. Dargavel, Elgin, Ont.
President—Henry Glendinning, Manilla, Ont.
1st Vice-President—J. H. Singleton, Smith's Falls, Ont.
2nd Vice-President—T. A. Thompson, Almonte, Ont.
Secretary—R. G. Murphy, Brockville, Ont.
Treasurer—J. R. Anderson, Mountain View, Ont.

Directors:

John H. Singleton, Smith's Falls.
Neil Fraser, Vankleek Hill.
Edward Kidd, North Gower.
W. H. Olmstead, Bearbrook.
John McGregor, Alexandria.
William Montgomery, Gravel Hill.
J. T. Payne, Brinston.
James A. Anderson, Oxford Station.
J. B. Wilson, Wilstead.
T. A. Thompson, Almonte.
Jos. McGrath, Mount Chesney.
Charles Anderson, Overton.
Alex. Hume, Menie.
G. A. Gillespie, Peterboro.
W. S. Blakeley, Cherry Valley.
Henry Glendinning, Manilla.
James Whitton, Wellman's Cors.

Auditors:

J. A. Kerr, Belleville; A. S. White, Sidney Crossing.

FINANCIAL STATEMENT FOR 1909.

RECEIPTS.		
Balance from 1908	$ 227 10	
Ontario Government Grant	1,666 00	
Leeds and Grenville Grant	200 00	
Town of Prescott Grant	100 00	
Membership fees	161 00	
Advertising in programme	175 00	
Money received from fines	1,207 34	
Miscellaneous	14 75	
Balance due Treasurer	65 81	
		$3,817 00
EXPENDITURES.		
Annual Convention:		
Expenses of officers and directors	$ 326 20	
Reporting convention	110 00	
Advertising	268 95	
Clerical assistance	28 95	
Miscellaneous	100 00	
		$ 834 10
Executive Meetings:		
Expenses of officers and directors	$ 443 80	
		$ 443 80
District Meetings:		
Services and expenses	$ 179 80	
Advertising	165 50	
Rent of halls	47 25	
		$ 392 55
Salaries and expenses of officers (secretary $300, treasurer $100) and office assistance	$ 458 50	
Printing, postage, stationery, etc.	76 35	
Inspectors' services and expenses	1,398 30	
Auditors' fees and expenses	48 75	
Bank charges	51 95	
Farm and dairy membership	112 70	
		$2,146 55
		$3,817 00

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

OFFICERS FOR 1910.

President—Jno. H. Scott, Exeter.
1st Vice-President—Wm. Waddell, Kerwood.
2nd Vice-President—D. A. Dempsey, Stratford.
3rd Vice-President—S. R. Wallace, Burgessville.
Secretary-Treasurer—Frank Herns, London.

Directors:

J. N. Paget, Canboro.
W. S. Stocks, Britton.
J. B. Smith, Alton.
Geo. M. McKenzie, Ingersoll.
S. E. Facey, Harrietsville.
J. J. Parsons, Jarvis.

Auditors:

J. A. Nelles, London.
J. C. Hegler, Ingersoll.

Representatives:

Canadian National Exhibition, Toronto—Robt. Johnston, Woodstock.
Western Fair, London—I. W. Steinhoff, Stratford.

FINANCIAL STATEMENT FOR 1909.

Receipts.

Cash on hand from previous report	$ 867 84
Members' fees	329 00
Legislative grant	1,666 00
Money received from prosecutions	912 50
Sale of exhibits	1,596 89
Advertising in programme	120 00
Loan	590 00
Donation	5 00
	$6,087 23

Expenditures.

Cash paid for prizes	$ 440 00
Expenses for conventions or regular meetings	170 04
Stenographer's salary, $440.00; directors' fees and expenses, $197.25	637 25
Postage and stationery, $112.65; printing, $179.88; advertising, $20.70	313 23
Judges' fees and expenses, $49.05; lecturers' expenses, $196.30	245 35
Inspectors' salaries, $361.00; other expenses of Inspectors, $256.80	617 80
Periodicals for members	214 41
Cost of reporting	75 00
Refund to members, $2.00; office furniture, $7.45	9 45
Purchase of exhibits	1,616 09
Office light, cleaning, sundries	79 46
Office rent $120.00; auditors' fees, $13.00	133 00
Telephone and telegraph	93 43
Express and storage	17 02
Half fine paid to factories	456 25
Tenth call on Stock, Farm and Dairy, Peterboro	50 00
Paid loan, $590.00; interest on loan, $13.12	603 12
Balance on hand	316 33
	$6,087 23

Dairymen's Association of Eastern Ontario.

ANNUAL MEETING.

The thirty-third Annual Convention of the Eastern Ontario Dairymen's Association was held in the City of Belleville, on Wednesday, Thursday and Friday, January 5th, 6th, and 7th, 1910.

Mr. John R. Dargavel, M.P.P., President of the Association, occupied the chair at all the meetings.

PRESIDENT'S ADDRESS.

By John R. Dargavel, M.P.P., Elgin.

At a meeting of our Executive Committee, which met in Toronto in September last, a large and influential deputation was in attendance from your city and asked that this, the next Annual Convention, be held in your beautiful city of Belleville, and apparently the right men were sent, as their request was complied with.

I am very much pleased with the outlook for a most successful meeting, and on behalf of the Board of Directors, wish to thank the local committee and all those who have showed a willingness to work in conjunction with our officials to make this convention a success.

In looking over the work of the year just closed, we find that there has been, so far as exports are concerned, a slight increase in cheese but a decrease in butter. The increased make of cheese appears to have been in the Province of Ontario alone. But, as I mentioned in my address of last year, that while this review of the dairy situation may show but very little increase when viewed from an export basis, with an increased home consumption added to the export business the financial side of the question cannot but please the milk producer.

The object of this Association, as stated in the constitution, is to promote the interests of the dairy industry of Canada and more particularly Eastern Ontario. In order to carry out those interests we must, therefore, know what those interests are, what will promote them, and then do those things. There is much that we can do as an Association that as individuals we cannot do. We must promote the interests of the industry as a whole, and do those things which will make dairying more attractive and profitable to those engaged in it. We believe the most important thing possible to be done to promote the interests of the dairy industry in our province is to educate the people who are engaged in it.

But the nature of our business is such that a college course in dairying cannot be acquired by all, though the importance of the industry, and the well deserved attention that is now being given to all matters pertaining to food and food products require a better knowledge of farm sanitation in general and dairy sanitation in particular, to the end that Canada's dairy products may reach the highest possible standard of purity and excellence. Again, the industry can be promoted by a better understanding amongst its followers of the requirements of success. Too many fail to appreciate the value of the right establishment at the start. The time is very near at hand when a man will not be called a dairyman who operates an ill-adapted farm with inferior animals and an inadequate equipment. No person should be recognized as a member of the great fraternity of dairymen who is not keeping abreast of the times in all that modern, up-to-date dairying means, and it means a well adapted location, stock bred and handled especially for dairy purposes, equipment for the manufacture of dairy products, that will not only be a credit to the producer but to the industry, and an intelligent operation of all these things.

As a result of having been made a member of the Milk Commission by the Ontario Government, I have had opportunities during the year just passed, to visit some of the best dairies in the United States and Canada, and I can assure you that we are a long way behind where we should be. We certainly must have a higher ideal in this business and work towards it, or go out of business. I do not wish, at this time, to forecast what the report of that Milk Commission will be, but I would be wanting in duty as your president if I did not warn you now that better things will be expected from everybody engaged in this business than has been done in the past. The dairy business of this country is of too much importance to allow it to be conducted as is done by some people now engaged in it. I would be criminally derelict in my duty, knowing what I now know, if I did not sound a note of warning to my fellow dairymen in reference to the spread of tuberculosis among the dairy cattle of this country. I feel convinced that this dread disease, even now, exists to a much greater extent than is known to the ordinary dairyman of the province.

For many years past we have been housing our herds in warm stables, many of them, yes, most of them, poorly lighted and ill-ventilated. Tuberculosis is essentially a house disease for either man or beast, and the housing of our cattle, as a rule, is of the most unsanitary kind and especially favorable for the propagation of this terrible plague. Saying nothing about the great moral responsibility we are under to supply our customers with only pure and healthful food products, we shall be sadly remiss to our own natural interests if we do not, each one of us, and at once, take proper and efficient measures to prevent the propagation and spread of a disease, which, if not checked in time, will surely lead to the ruination of our herds and our business.

We have, heretofore, boasted of leading the world in this industry, but we are just now at a point where it may be well to sound a warning note. We are, as yet, the largest exporters of dairy products to Great Britain, but this New Zealand competitor has moved her position from fifth or sixth place in a few years to second place. Listen to what the Dairy Commissioner for New Zealand says in his report: "New Zealand has had a good reputation as a cheese-producing country and so long as the quality is well maintained we need have little fear in marketing the article to as good an advantage as other countries engaged in the same line of business. The dairying industry, generally, is in a flourishing condition in New Zealand, and dairy farmers are to be congratulated upon the distinction which the industry has attained as one of the principal commercial mainstays of this colony."

These people are certainly our keen competitors, and it behooves us to be up and doing if we maintain our present standard of supremacy.

I wish, before closing this address, to say that I have now filled the position of President of this Association for three years with much pleasure to myself, but with what profit to the Association is best known to its members. I am about to sever my connection with the Board of Directors, and in doing so I feel that I am deeply indebted to the members of the Board who have so cheerfully rendered me their assistance, which has made the work of presiding officer comparatively easy. If the services I have rendered have met with your approval I am more than repaid for my labor, and I tender you my sincere thanks.

ADDRESS.

By Senator Daniel Derbyshire, Brockville.

I congratulate you, sir, upon the address we have just listened to. It has been thoughtfully prepared, and I assure you it will be very inspiring to us all. You talk about the right men being sent to Toronto to influence the directors to hold their next annual convention in the city of Belleville, and I want to say that they were a pretty slick lot, and without much trouble they had all the directors with them to hold their convention here. I must say that as soon as they brought us here, and during the time of our meeting with them, and since making preparation for holding this convention, they have carried out their promises. We, of course, expect all of you to become members. The year just passed has been a memorable one in a great many respects. While our production of cheese in Ontario is slightly increased, the Province of Quebec has been a little less, and in consequence our products for this year are about the same as last year. Of course, the butter business has gone back, over a million dollars less of butter being shipped this year than last and seven millions less than 1905, the banner year in connection with our dairy business. A great many would think that there is less production in our country. I would like to say that our production has been greater this year than in any year in the history of Canada. We have produced more milk of a finer quality than in any year in the history of Canada, and while we have not exported to the Mother Country so much goods, we have consumed them at home, we have a prosperous people, and as you know over a million people have gone into the North-west in the last few years. This last year over 90,000 went into the North-west from the United States, and they had $90,000 000 in money with them. These people are prosperous and good farmers; understand about the handling of the land in the west, and are making some of the best settlers we have. They have to be fed, and we have been making butter and cheese in the east and shipping to these people in the west. We have in the banks to-day to the credit of the people over two millions more money than we had a year ago; this means that the people have a greater buying power, and can spread the butter a little thicker, and they will consume three times as much butter as they did a few years ago. These things we want to take into consideration when we are comparing our production with the last few years. We are cultivating a home market, and that is the best market of all. I have been figuring on the difference of this year, and while possibly my figures are not absolutely accurate yet I have gone into it very carefully. We have over 130,000 cheese in Montreal to-day; 60,000 in the West and about 12,000 in Eastern Ontario. We have about 200,000 cheese yet to go forward of this year's product, and all along the line, especially in the Province of Quebec, some of the dairies that used to sell 23 and 24 packages of butter sold 300 to 400 packages this year. Train loads of cream have gone from Canada to the United States. The cream is being sold at profitable prices to the United States, to help feed these people who have not got enough wisdom to keep enough cows to take care of their own people, and this business is bound to increase. Right in the town of Brockville, we have been shipping cream for the last two months across the river and it is manufactured into butter there and shipped to New York and Boston, to feed these people on fresh beautiful butter that is Canadian in every respect except that it is made in the United States; we do this to avoid the duty. I want to say that I have carefully figured over this cream, and the immense amount of increase in our cities in the consumption of milk and cream. There are thousands of pounds of butter in Montreal, Winnipeg, Vancouver, and other large cities. Car loads go to these cities nearly every day. And then when you take into account the bacon pig, we have sold $125,000,000 worth of dairy products this year. There is another thing to be pleased about, that is that we have sold a better quality of goods. The Government of Ontario selected a man—and I am delighted that they selected Mr. Dargavel, one of our directors—as a member of the Milk Commission, and that shows wisdom of Sir James. I am sure we all look forward to getting this report because I believe it will be of great importance to the milk producers throughout the whole Province of Ontario. The farmers produced $100,000,000 more work this year than they did before, and we have $2,000,000 more money in our banks than we had last year. Some of you will say "We can rest on our oars and take our ease," but I want to say to you to-day that I am more anxious than ever that we buckle on our armour afresh and that we should give a better cultivation to the soil, and that we should cultivate our farms and have a productive soil, so that we can produce twice as much as we ever did before. In 1908, we had not enough feed to take care of our cattle and make the cows productive because they were starving in the fields, and they were not producing the milk they should. We find that the most important thing in Eastern Ontario is the production of feed. A great many farmers turn out their cows in the spring, and look up in the clouds and think they are going to have rain, and trust to Providence to supply their water and grass, and the cows are looked to give milk no matter whether they are cared for or not. We must make provision to feed these cows every day of the year, provided we expect to get the product we ought to get from these cattle. You remember Mr. Timothy Eaton, the great merchant prince of Toronto. He was getting cream from the farmers until it became so bad that he could not stand it. What did he do? He went out and bought a farm, and commenced to under-drain the soil and cultivate it, and produce twice as much crops as were produced before. He put on good dairy cows, and got them taken care of in a proper way, and the result was that the restaurant part of his business increased seven-fold since he began to make a better quality of milk and butter. If we could get the wealthy merchants in every part of the country to get back on to the farms and use the money that they have in building up such large industries in the cities, then our product would increase by leaps and bounds. We have a man in Brockville, Mr. A. C. Hardy, who has bought a farm outside of the town, and he spent last summer putting in tile and beautiful barns and getting it stocked with cows that are exactly suited for getting milk, so that he can produce more milk on an acre than was ever produced before in that locality.

I would like that every man when he goes home from this convention would look over his stock and his fields, and see if he cannot under-drain and give his farm intense cultivation, and see if he cannot produce twice as much on each field as he has ever produced before, and see that his cream and milk is taken from the farm and factory in better condition. We are getting into competition with New Zealand. The cheese from New Zealand begins to come into the markets of England in December, and our goods begin to come in about the first of May and while we make 2,000,000 boxes of cheese against 400,000 that they make, still they are in our way to-day, and the merchants are buying from hand to mouth, and expecting more from New Zealand the next week, and using that to bring down the prices of our goods. That is something that is working to our disadvantage, and if we would make 3,000,000 boxes and send them to the British market we would close them out, and they would go right on making butter. They made butter up to five years ago, and then they turned to making cheese because they found it was the most profitable.

In Eastern Ontario we have always studied up the cheese business, and we have been wise in our day and generation. We have made the finest cheese, and we have made money by it, and we have built up a name for ourselves that is known in Great Britain to-day. We ought to take care of our reputation and increase our shipments. With the soil and the climate and the possibilities we have here, we ought to produce twice as much goods as we do.

We all regret the retirement of our President, because for a great many years he has been an efficient director and rendered valuable service to me when I was your President, and to the Board of Directors. He has filled the position of President for a number of years with great acceptance to us all, and to the people in Eastern Ontario. He has been invaluable to us as a member of the Legislature and seeing that the laws were enacted, and seeing that the money for carrying out these things was provided. He has been enthusing the Ministers with the idea of the advancement we were trying to make in giving free education to all the cheese factories, and in taking off the fifteen dollars tax that we collected from the factories. This has all been changed on account of Mr. Dargavel being a member of the Legislature. On account of his being on the floor of the House he has been able to get the Ministers to feel the importance of the cheese industry.

I will tell you that I had the distinguished honor of being Honorary President alone for a number of years, and I would like to move a resolution here this morning that Mr. Dargavel be made an Honorary President of this Association. I think it would be only fair for me to move this resolution, seconded by Mr. Edward Kidd, M.P., that we make Mr. Dargavel, Honorary President of the Eastern Ontario Association. (Motion put to the meeting and carried, with applause). I am sure we all feel proud that we have men who are willing to serve us, and are willing to give us their co-operation and help to make this Association the very best in Ontario. We have led the way in the past, and we must lead the way in the future. The President alluding to the Hon. Mr. Fisher, Mr. Duff, and Mr. Ruddick, said, "I am sure that no words of praise that can be given to these gentlemen for the services which have been rendered to this Association would be too strong." There is another man that I would like to have coupled in with that, and that is Mr. Publow, our untiring Superintendent of the Kingston Dairy School. His services have been valuable to this Association for a great many years.

I would like to speak to you for a few moments on the subject of refrigerator cars. While we appreciate the services we have had in the past we feel that that service should be extended. We ought to have these cars put on earlier in the summer. Last year we had hot weather in June, and these cars should have been put on two or three weeks before they were put on, and we ought to have them in large numbers so that all our goods from spring to fall could arrive in the British market in the best condition. That is of vast importance. If we spoil two or three shipments of cheese in the spring on account of becoming over-heated, that influences the whole year against us. That is one thing that helps New Zealand. Their goods have to go through a tropical climate, and they have to go in refrigerator compartments. It is impossible to send them any other way, and in consequence of that they do arrive in the British market in the finest possible condition. I am sure that we will see the importance of it. To make Canada famous is the position we all ought to take, and use our influence and our best efforts in getting more money for goods, and making things easier around home. We should have telephones and electric bells around the farm houses. We ought to have all these things, and we can have them, provided we work intelligently and produce more food of a better quality. If I could only get everybody up here in Eastern Ontario to say that they would do better this year, I would love to do it, and I would like to twist the neck of some who I know are not doing it. Do you ever consider what we can do by united efforts to build up this country? It is marvellous, the results that would follow if every one would do his level best.

I am delighted to have had the pleasure of having been here with you. My heart is warmed up to see you take such an interest in your work and I want you to do better business in 1910, than you have ever done before, and that when you do you will have the proud satisfaction of knowing that 1910 was a more prosperous year than 1909.

RESOLUTIONS.

Moved by R. G. Murphy, seconded by J. A. Kerr, "That whereas the success and educational value of this Convention is largely due to the presence of the speakers who have so ably addressed our meetings we desire to express our sincere thanks for their kind assistance and presence throughout the various sessions." Carried.

"That we the members of this Association desire to express our appreciation of the kindness of the Mayor and Council, and citizens of Belleville generally for their co-operation in helping to make this Convention a success." Carried.

"That the thanks of this Convention be and are hereby tendered to the Canadian Salt Company of Windsor, Ontario, through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Members of the Association." Carried.

"That we as dairymen feel that we are under great obligation to the Departments of Agriculture for the Province of Ontario and also for the Dominion of Canada for the assistance they have rendered the Dairy Industry of Canada." Carried.

"That as an Association we wish to express our satisfaction with the work of the special officers appointed to take charge of the work regarding the adulteration of milk." Carried.

"That this Association wishes to express its gratitude to the several railroad companies for their kindness in reducing rates from all points to Belleville" Carried.

THE CHAIRMAN: I would be more than human if I did not appreciate the very kind remarks that have been made by the Senator Derbyshire and the resolution that you have just so unanimously passed. I note the fact of your selecting me Honorary President very much. I appreciate it from the bottom of my heart; but so far as helping me to take any more interest in the dairymen of this country it is altogether unnecessary. I shall do that whether I occupy an official position or not. I shall do what I can for the interest of the dairymen so long as I can get a dollar to become an annual member of this Association. (Hear, hear.) Senator Derbyshire has been very kind and flattering in his remarks as to what I have done for the Association. I do not take this to myself at all. I have already had the very best of help and assistance not only from the members of the Board of Directors, but you know we have a very efficient Secretary, and without his aid I would not have been able to accomplish even what little I have done. When I look back and see the position of the Association before our friend the Senator became President, and see what this Association was then and what it is now, and see what it has accomplished in all these years I do think that we have done something for the people of this country. I believe that without the aid of the Dairymen's Association the business would not have been in the position that it is in to-day. We must admit that we occupy the foremost position in the world as exporters of dairy products. Unless we had had some association to have guided us in our efforts in the last twenty-five years, I am sure we could hardly have attained the position we occupy. We must not content ourselves by looking backward, by any means. We must look forward and see what there is ahead of us to accomplish in promoting the interest of agriculture. I am sure that there is much yet to be done. Few of us realize the extent of the Province of Ontario, and I must confess right here that it is only lately that I have begun to realize myself the wonderful heritage we have in this Province of Ontario—the wonderful extent of fertile country and the various kinds of climatic conditions, the various kinds of soil we have. It is something to have a grand Province like this to work for, and it should be an incentive to us to leave it a little better when we step off the stage than when we found it, and we should be thankful that the Almighty has privileged us to be born and to live in a country like this. I again thank you from the bottom of my heart for the great honor you have given me to-day. You can always count on me as doing everything in my power to further the interest of the dairymen of the Province of Ontario. (Applause.)

COMMITTEES.

The following Committees were then appointed:

Resolutions: R. G. Murphy, A. S. White, J. H. Singleton.

Legislation: J. W. Johnston, M.P.P., J. R. Dargavel, M.P.P., G. G. Publow, Senator Derbyshire.

Nominations: James Whitton, Senator Derbyshire, Henry Glendinning, J. A. Kerr.

Business: J. A. Kerr, T. A. Thompson, Edward Kidd, M.P., John McGregor, A. S. White.

THE PRODUCTION OF CHEAP MILK.

By Henry Glendinning, Manilla.

In large manufacturing concerns and in high finance you hear a great deal of mergers. They give you as their excuse for merging large concerns into one huge concern that they can reduce the cost of production and that argument is a proper and legitimate one. I do not think it is possible for the farmers of this country to organize a merger or combine in the production of milk or their farm products, but I do believe that they can take a leaf out of the book of those large manufacturers along the line of cheap production. Every farmer in the Province of Ontario can do something to cheapen production.

The first thing that we require to consider in order to produce milk cheaply is that of having the proper kind of cow, assuming of course that you have the farm to pasture the cows and grow feed upon it. I believe the cow that will produce milk cheapest is the cow that has been bred specially for that purpose, and that has blood in her veins running back for hundreds of years, and that has been bred specially along milking lines. I will not discuss that question further. I will presume that you have the proper kind of cow. We require for that cow proper housing, and in these houses we must have proper ventilation; and then we require water, feed and proper care.

I want to say something in particular regarding the housing of the cow. I have had the pleasure this season of visiting more farms than I have ever visited in any one season before. I have visited a number of the best farms in the western part of the Province of Ontario, in connection with the prize farm and dairy competition. I was one of the judges and in the performance of my duties I visited these farms. Practically every one of them had fine buildings, well equipped. But there is one thing I noticed that I think farmers of Ontario are lacking in to a very great extent, and that is ventilation. In most of these fine buildings we noticed a lack of ventilation. The farmers appear to work upon the idea that air is something that we do not require to give very much attention to. Of all things that are required, air is the most important. A cow or a human being might live weeks without food, they might live a number of days without water, but neither a cow or a human being could live five minutes without air. If you take a cow and put her into a room sealed so that no fresh air could get in, or foul air get out, she would breathe enough air contained in a room 14 feet long by 14 feet wide and 14 feet high, at the end of twenty-four hours she would have exhausted the whole of the oxygen, and at the end of that time she would die. We would not like to put a cow into a room of that kind for twenty-four hours, because a greater part of that time she would have been breathing poisoned air.

Now, to get some idea of the size of the building which would be required to contain cows for twelve hours, supposing the doors were closed at night and opened in the morning: If you had a herd of twenty cows, you would require a building 280 feet long, 140 feet wide and 14 feet high. That would be a very large stable for twenty cows. It is not necessary to have large stables to keep cows in proper condition, what you require is to have the stables so constructed that there is a change of air going on continually—fresh air coming in and foul air going out. You will find in some stables a few three inch tile in the top of the wall here and there, just as if these tile would carry off all the foul air and let in all the fresh air the animals require. It is impossible to do so. By placing those tile in the top of the wall and not having any place for the air to get in at the bottom, you are making a great mistake, and one of these great defects is that they carry off the warm air. We do not want to carry the warm air out of the stables, we want to retain it, but we want to carry off the foul air. Air that has been once breathed and has had all the oxygen taken from it is about one-half times heavier than pure air, and immediately after it becomes cool it falls to the lower part of the stable, and there is where you need to carry the foul air from. You must have it constructed so that it will cause no draft, and will carry the foul air out at the highest point of the barn. If you have your ventilation constructed in that way you retain the warm air, and at the same time keep up the temperature of your stable. Any farmer who contemplates changes in his stable should buy that little book of Professor King's on ventilation. It only costs 75c., and it is a splendid book.

Water is very important. I am in favor of having it constantly before the cows. Some men say that it is better to turn them out and let them have a drink only once or twice a day. I believe that the water before the cow, constantly, is an advantage, because she will not take a large amount of water at any one time, and by taking a little at a time she will be able to heat that amount of water, which is usually down to 40 degrees, up to the temperature of her body, which is something like 120 degrees. If she is taken out once or twice a day she takes in a large amount of water, and the body becomes chilled, and there is little or no secretion of milk. Objection has been raised at times in regard to having water before the cows that they do a lot of lapping and keep their mangers wet. I believe that in every case where you find lapping it is not the fault of the cows but of the system. I have two cows in my own stable that lap, and I watched them and their heads are a little longer than the others, and they had to put their heads under the rack to get the water, consequently they hold their heads a little bit sideways and lap. Basins that do not feed fast enough are another cause of lapping.

I believe a cow should have a constant supply of salt; they should at least have salt once a day in the stable as well as in the pasture field.

The question that I want to discuss most this morning is that of feed for cows. Everybody will acknowledge that without a good supply of feed you cannot get a good supply of milk. We have none of these troubles in the summer time when the grass is plentiful. Grass contains all the requirements for the production of milk and there are other things that tend to give a large flow of milk at that time of the year. For instance, the cow is out in the pure air, she has abundance of air and plenty of water. She has cast off her old hair and her skin is clean and under these conditions, with a good supply of grass, little thought need be given to the question of feed; but when we come to put a cow into the stable under conditions entirely different to that, we require to give the matter a great deal more attention.

We should try to imitate these outdoor conditions as much as possible. The stables should be warm and comfortable and contain plenty of fresh air and sunshine. Sunshine and air are two of the cheapest things we have in this world and some farmers think they are the least required.

Our president gave us a splendid address this morning, in which he touched on the question of tuberculosis. I think he could not speak too strongly on that point. Tuberculosis is a great deal more common in the country than we think of, and if our cows had plenty of fresh air and plenty of sunshine, that disease would not be nearly as prevalent as it is. I believe that if that disease is to be stamped out of the country, it will be stamped out to a great extent through these two agencies, fresh air and sunshine. Our stables should be in a comfortable, sanitary condition if we are to do good work in the winter, and we must have the feeding conditions as near summer conditions as possible. The food should be bulky, succulent and palatable and at the same time cheap.

DIGESTIVE NUTRIMENTS OF FOOD STUFFS.

——	Dry Matter.	Ash.	Protein.	Carbohydrates.	Fat.	Nutrient Ratio.
June Grass (green)	34.9	2.8	3.	19.8	.8	1: 7.2
Corn Silage	20.9	1.4	.9	11.3	.7	1: 14.4
Mangels	9.1	1.1	1.1	5.4	.1	1: 5.1
Timothy Hay	86.8	4.5	2.8	43.4	.4	1: 16.7
Red Clover Hay	84.7	6.6	6.8	35.8	1.7	1: 5.8
White Clover Hay	90.3	8.3	11.5	42.2	1.5	1: 4.
Alfalfa Hay	91.6	7.4	11.	39.6	1.2	1: 3.8
Wheat Bran	88.1	5.8	12.2	39.2	2.7	1: 3.7
Oats	89.	3.	9.2	47.3	4.2	1: 6.2
Milk	12.8	.7	3.6	4.9	3.7	1: 3.8

Silage and roots will give you a bulky succulent food that will be palatable. I have heard men say that roots would not have very much in them because they were 90 per cent. water. They say we could feed dry feed to our cows and they could drink water and they will give as good results. I venture to say you will get better results from food that is naturally of a succulent nature. The most important element for milk production in a food is that of protein. In silage you have a small amount, and you will come to grief if you feed corn silage entirely and expect a big flow of milk. You cannot do it. A cow is compelled to consume a very large amount of silage before she will get enough to produce 100 pounds of milk. However corn silage as a basis is one of the best foods we have, although we have to substitute something else with it. Wheat bran is being very commonly used through the country, but it is becoming very expensive; very few people care to buy large quantities of wheat bran at the present prices and sell milk at the current prices. We have in alfalfa hay a product that is nearly equal to wheat bran, and we can raise that at our own farms, and for profitable milk production we must raise the feed on our own farms. I do not think it will pay to purchase feed even if you sell the milk at what is considered fancy prices in the cities. There is not very much in it. Alfalfa hay has all points as against wheat bran a little over twelve.

We do not run an experimental station at our place, but once in a while we make some tests. It is rather expensive to carry on experiments—weighing up everything carefully and keeping track of it. But commencing on the 29th day of March last winter, we put three cows under test. These cows had calved from three to six weeks, so that they were in good condition for putting under test, and they were all in good physical condition. Two of them were fed exactly alike and one was fed a little less. Two of them, each consumed 280 pounds of corn silage in the week and we placed the money value at $1.25 per ton on that. That is what we considered was the cost of production; not what it would sell for but what it cost us to produce. That was 17 1-2c. for each of these two cows. They consumed 140 pounds of roots at 4c. per bushel, a little over 9c.; 145 pounds of alfalfa hay at $4.00 a ton, 29c. each.

The other cow did not eat quite so much. She consumed 245 pounds of silage, but she ate the same of the other stuff. The money values of these foods for one week was $1.65 and a fraction over. Those cows gave 602 pounds of milk. Two of them tested 4.6 of butter fat, and the other 4 per cent., and the amount of butter fat that that milk contained was 26 and a little over in the seven days. Now, the cost of producing that milk was 27 4-10c. per hundred pounds. You will notice there was no grain of any kind fed except the grain that grew in the corn, no chop.

The following week they were not under test, but they were being brought up on chop until the two weeks following they were put on test again. They had been brought up gradually with the food so that there would be no rapid change, and they were then fed five pounds of chopped oats each. The cost of producing that milk was considerably increased, we got a little more milk—we got 692 pounds, that was 90 pounds more milk than we had before. The cost had been increased from $1.55 to $2.88 by the addition of that chop. Now, I want to say that the chop was not charged at the cost of production; because I do not know what it cost us to produce it, but it was charged at $25 a ton. The cost of producing that milk was increased from 27 4-10c. to 41.8c. (nearly 42c.), just by the addition of that five pounds of chop to each of these animals. The first test produced butter at 5.4 of a cent, while in the other the cost was increased, and it cost 51 per cent. more to produce milk and butter by the addition of that five pounds of chop. Prof. Dean made a statement at Guelph during the winter fair along this line: "I believe the farmers of Ontario could very materially reduce the amount of grain fed to their animals." I have been working along this line for a number of years, and I was pleased to hear Prof. Dean make that statement. The little experiment we conducted last winter shows that it increased the cost of producing butter fat 51 per cent. by adding only five pounds of meal to the ration. What would it cost to produce milk if you add twenty or more pounds a day? During the winter fair at Guelph I understand some of the cows were receiving twenty pounds of chop a day. It would be interesting to know how much profit there was from the milk obtained from cows fed in that way.

I believe the salvation of this country, so far as winter dairying is concerned, is in the feeding of a rough bulky food containing the proper nutrients, and I believe we come nearest to that by feeding corn silage, alfalfa hay, and roots, combined, and in feeding these there is not the least danger of your animals going off their feed. When you feed a large amount of corn, there is always danger of the cows going wrong in their digestive system.

I do not know that I have any more to say but I expect some of the gentlemen here will have some questions to ask. I have only touched upon the subject and I prefer you should ask questions.

Q. Why did you feed oats to those cows instead of something else that has protein?

A. They were having too much protein as it was. We had protein in the alfalfa hay. Those cows were getting a ration of one to five and when you feed oats they are about the proper thing. If I had fed pea meal it would have been as good a ration as oats.

Q. What did you feed your cows before the first test began?

A. They were fed exactly the same as what they fed the first week.

Q. Do you think you can retain the flesh on the cows without grain?

A. Yes, we do, and when it comes to drying up time, those cows will get fat.

Q. How much does it cost to produce butter on June grass?

A. I cannot answer that question. I can tell you a good deal better what it cost to produce in the winter stable. Those cows cost us about six cents to produce butter, a little over five cents to produce butter fat. I do not think we produce butter on the summer grass twice as cheap.

Q. What would you recommend to feed when you are not milking in the winter?

A. I do not think that you can feed anything better than that, because I think you can produce that as cheap as anything else on the farm. I think one of the mistakes many of the farmers are making is that they let the cows run down in flesh when they are drying. If we are going to get good results from cows we must have them in high condition when they calve. Of course, I know when cows go dry they always get a considerable quantity of straw. I am not saying not to feed straw. If you had to produce one food alone for cows, I do not know that you could produce anything cheaper than alfalfa, but alfalfa and corn combined make the best ration.

Q. Don't you think it would cheapen the cost to feed straw instead of hay?

A. I am not feeding any hay except alfalfa.

Q. Don't you think straw would be cheaper than alfalfa?

A. No, I don't think it. Straw has a nutritive ratio of about 1 to 34, and if you feed corn silage and a few roots and straw you would have a ration that your cows would not flesh up, but they would go down in flesh. You would have to feed protein, when they are either milking or dry, to get the best results, but more particularly when giving milk.

Q. Do you think that a test for one week is sufficient? Do you not think the feeding of grain would improve the condition of the cow, and she would give a larger yield, and the cost per hundred would be reduced?

A. This was the second week we fed grain. There was one week in between to bring them up to that point.

Q. The first week you were not giving them the full feed?

A. We commenced with a couple of pounds a day and brought them up gradually and they were being fed five pounds before they commenced and five pounds during the whole of that week.

Q. The improved condition of the cow in flesh would not show in one week?

A. I do not think she would improve, because you had all the nutritives in that alfalfa hay, that you have in the grain, we do not want to lose sight of that.

Q. I have fed alfalfa hay, and I do not see much difference in that and red clover.

A. Did you save it well, and were the leaves all on it?

Q. Practically.

A. That silage cost us $1.18. There is a great deal of difference in alfalfa hay. If you do not cut it just at the right time, you are apt to lose a great many leaves, and they form the most important part of the plant. The stems of alfalfa, I do not think are any better than the red clover.

Mr. Hyatt: You figure the alfalfa hay at the cost of production and the oats at market price. You should give us the oats at the cost of production.

A. I do not know. I have not got it; I do not know what it costs to produce oats. That was the market price.

Q. Put alfalfa hay up to the cost of the market?

A. If I sold alfalfa to myself and fed it, my profits would be the same.

MR. HYATT: That just makes the whole story look a little crooked. If the prices are not at the cost of production, then the alfalfa must be put at the market price.

MR. GLENDENNING: I only know a few things and Uncle John Hyatt is one of the men I have gained a good deal of information from, and perhaps he can tell us the cost of the production of oats.

MR. HYATT: I cannot do it.

MR. GLENDINNING: Then there you are, two of us alike. I knew when I figured that up that it was open to that objection. What is the use of me talking about somethng I do not know?

Q.—Are you not a little low on the cost of silage?

A.—No.

SENATOR DERBYSHIRE: How do you keep the flow of milk up in June and all summer, when it costs very little? If the farmers would prepare silos for the year before at a cost of $1.18 a ton, and had them ready to open up just the moment the dry weather came in the summer, it would pay. It came last summer and it will come next summer, and every one of you farmers know that if you let a cow go dry in the summer she will never come up that year, and it is a woeful mistake to not have a good supply of feed on hand for the dry spells during the summer.

MR. HYATT: How would you recommend us to proceed?

SENATOR DERBYSHIRE: I would take 2½ acres or 4 acres that was near at hand, and I would tile drain that every 8 rods and have the water conducted off the field; and I would plow that field and fit it for a crop, and then I would plow it again, and I would plow it the third time, and I would put on the disc-harrow and I would put on all the manure that came out of the stable and fit that land for an immense crop, and I would have a cedar swamp of corn for the next year.

MR. GLENDINNING: I have not got the figures with me, but I know of people to whom these figures were submitted a year ago and they thought they were fair. I thought they were too low, but after thinking them over, I came to the conclusion there was no fault to find with them. I placed the figures at $1.25, but the actual cost was $1.18.

A MEMBER: I am satisfied you can produce it for $1.25. I have heard men say they can produce it for less.

A MEMBER: We do not have much trouble to raise corn, but this alfalfa clover seems to be a trouble. We cannot even do it for $10 a ton, and we have tried it a good many different ways.

MR. GLENDINNING: I have been growing alfalfa for some fourteen or fifteen years and if I heard anybody speaking as I have been speaking to-day, eight or ten years ago, I would say just the same as that gentleman in the audience who has just spoken. We got good crops of alfalfa, but it always disappeared in the spring, but in every case we were able to trace it to one thing, and that was pasturing the alfalfa in the fall of the year. It may be that alfalfa can be pastured in the fall under certain conditions, but it is not a very wise thing to do. Take the side of a hill exposed to the south, and alfalfa will stand a great deal more rough usage there than on level ground, just the same as fall wheat will come out better in a south-east exposure, and the alfalfa will come out better. The proper thing is not to pasture alfalfa at all, and do not cut it late in the fall. When the snow came our alfalfa was about 16 or 20 inches high, and my neighbor said to me, "Why don't you cut that, there is a lot of good feed going to waste," but I did not think it was going to waste. It was left there to hold the snow, and we have a blanket of snow over that field at the present time.

Q.—Did you cut it three times?

A.—We only cut twice, we could have cut it three times, only there was such a dry spell in June and July that we did not do so.

Q.—How did you keep up the milk supply during that dry weather?

A.—We fed some of the alfalfa; it is one of the best things we have got. We had fifteen acres of it on hand. It comes at a time when there is nothing else except oats and peas. In fact that year, oats and peas were so short that you could not cut them.

Q.—Why didn't you feed silage at that time?

A.—Because we did not have it. I would have liked to have had it, but it was all fed owing to the late spring.

Q.—Is there any unpleasant odor in the milk, owing to the feeding of ensilage?

A.—There is not. You may have a flavor from silage, but if you have good silage, and your cows are milked in a cleanly condition, I do not think there is any danger whatever of trouble. Most of the odors that you get in the milk of a silage nature, come from the outside, not from the inside. I have tasted milk with a silage flavor, and after going to the stable, where the cows were kept, I was thankful that there was nothing worse than a silage flavor. If the silage is rotten or decayed, I think there is danger, but from good silage you need not be alarmed.

Q.—What is the best kind of silo to build?

A.—I have two wooden ones, and I have the cement on hand to build a cement one next summer. I believe the cement silo is the best.

Q.—Does the frost go through the silo and freeze the silage next to the wall?

A.—It will, just the same in a wooden silo. It depends on how you take it out. If you take the silage out properly you do not have any frost from a wooden or cement silo. Keep the outside a little low and you are all right. If you take the inside out first you will have frost. (Applause.)

PROBLEMS OF THE DAIRYMEN.

By George A. Putnam, Director of Dairying, Toronto.

We in the Department of Agriculture are called upon throughout the year to attend a great many meetings in the different parts of the Province, and the Deputy Minister and myself, who will be with you to-night, always enquire very anxiously about the Dairymen's Association meetings, because we expect a good time and a profitable time, and we have never yet been disappointed. Something of good always comes out of these meetings. You will remember that we had a meeting in Picton two years ago, and some of us had our doubts as to whether or not we would have a real good convention at Picton, because it was so far removed from the centre of the dairying industry, but you will all remember what a profitable time we had, and we have been glad to know that the enthusiasm on that occasion has resulted in some good to Prince Edward County, and, in fact, we believe, to the whole of Eastern Ontario. I remember well that the Deputy Minister took occasion at the evening meeting to say something regarding Women's Institute work, and the people of that district are always looking for something good. They were so impressed with what Mr. James said, that they asked me to send a lady delegate down there, and I did so, and we have nine thriving Women's Institutes in Prince Edward County, and they are doing a great deal to make life in the home much more pleasing and attractive than it formerly was. No doubt you have heard from the President's address, this morning, something as to the progress which has been made along dairy lines in Eastern Ontario during the past year. I believe real progress has been made throughout the whole Dominion, and it is gratifying to us to know that the efforts of the instructors and the Directors of the Association have resulted in a general advance all along the line. We notice that the makers and the owners of factories are taking an increasing pride in their business. They are showing a renewed confidence in the dairy industry. They are building upon more substantial lines, and they are making improvements which lead us to believe that they have confidence in the future of this very branch of Agriculture, and we believe the day has come when it will occupy a more prominent position relatively. They are taking a pride in their factories and fixing them up a little better. You see a great evidence of thrift and neatness, and they are observing sanitary conditions to a greater degree, and we believe that the owners will be rewarded by having altogether a better financial condition as the years progress. We have been more than gratified at the responses which we have had in the Department to the applications which we sent out for the registration of factories. The Deputy Minister asked me the other day how many applications we had, and when I told him we had 1,081 applications already, he said that he had no idea that the factorymen would respond so nobly. Registration may not mean so much, but it means this to me: that the factorymen are ready to co-operate in any line of work which has for its object the betterment of dairy conditions, and we will be able to do even more for the dairymen when they show this confidence in the work which the Department and this Association has in view. The makers are also showing renewed confidence in the business which they have chosen. They realize that it is something besides mere manual labour. It is a profession combined with strenuous manual labour. We believe a proficient maker needs to have as much scientific knowledge as so called professional men. In fact, he needs to know a good deal regarding many sciences, such as bacteriology, chemistry, sanitation and refrigeration, any one of which forms a large field for investigation, and for study. We believe that when we put into effect the legislation which has already been passed, the granting of certificates to makers, that while we have a large number of makers who are first-class men, we will have a still larger proportion of competent, industrious men, coming into the dairy field.

So far as the producers are concerned, we find that they are making rapid progress. We have been more than gratified during the past summer to know that many producers have made provision for the dry months of the fall, and grew grain and heavy crops of alfalfa to a larger extent than ever before, and then Mr. Publow tells you in his annual report that although we had six thousand less cows in Eastern Ontario during the past year than the previous year, yet the output of cheese was 50,000 boxes greater. From 6,000 less cows you have produced 53,000 more cheese. That means a greater increased profit, because you had 6,000 less cows to keep, and you made more cheese. Part of it was due, no doubt, to better weather conditions, but a great deal of it was due to the fact that the farmers are taking a greater interest in weeding out the poor cows. I believe that the short season, which you had two years ago, will prove a blessing in disguise, and you may say that it was well that you were afflicted, because I believe that the average production of the cows is much better than it was three years ago, due largely to the conditions I have enumerated, and also to the good work in which my friend Mr. Wheatley is engaged—inducing the farmers to find out what the individual cow is doing.

Mr. Glendinning has told you that you can grow alfalfa, and some men in the audience have said that they have tried it and found that it cost ten or eleven a ton. We sent out a circular letter from the Department of Agriculture early last spring, asking the prominent farmers, in practically all the sections of the Province, what experience they have had in growing alfalfa, and the extent to which it was grown in their locality. In a great many cases we got replies similar to the statement made by the men in the audience, that they had made trials time and again and had failed, but from practically every section in the Province, practically every county, we have got word from men stating that they have grown alfalfa. Many of these men who are now growing it successfully stated that they had several failures because they had not put their seed in right or had put in too heavy a cover crop, or pastured too close. I believe I am safe in saying that alfalfa can be grown in practically every section of this Province. If the land is properly prepared for it, and if it is given proper care, there is no crop which would be more profitable.

I had the pleasure this summer of taking a trip through Western Canada and returning by the Western States, and I was very much impressed by the fact that, roughly estimating it, in many of the far Western States, fifty per cent. of the tillable land was under alfalfa, and land which some few years ago sold for $25 an acre, is now bringing $152 an acre, and that is due largely to the fact that they have grown alfalfa. By applying to the Agricultural College, at Guelph, you can get a nitro culture which will inoculate your soil and make a crop almost certain.

Growing feed is of no greater importance than the weeding out of the cows, when you realize that one cow will make as much profit as forty other cows in the same district. That does not mean that one cow gives as much milk. What do we care whether we make three million or five million cheese; it is the amount of profit we are after. If you can get as much profit out of one cow as you can from forty, you would be foolish to milk the forty cows, and if you can make as much profit out of one million cheese as you can out of two million, then it would pay you to make the one million of good quality. The producers are showing that they are prepared to co-operate, by the better care they are taking of their milk. This holds good in Western Ontario as well as the East. The instructors tell us there is more hearty co-operation on the part of the owners and producers, and it is only by hearty co-operation of all engaged in this industry that we can hope to attain that success which we all look for.

You remember some years ago, that we had almost to force instructions upon the makers and the owners; but now, although we have a greater number of instructors, the trouble is to meet the demands for assistance that come from the various factories.

Mr. Publow, Superintendent of the Eastern Dairy School, informs me that the makers are showing renewed interest and confidence in their business, by the large number who have applied for admission to the Eastern Dairy School this year; a great many more applications than we ever had before. Even the dealers will admit that the cheese was good after they had settled up, and they are unanimous in saying that the product has shown a marked improvement this year, not only a better uniformity and a better quality throughout, but the proportion of rejected cheese is much lower than ever before, and we must admit that progress has been made. You must remember that the nearer we get to perfection, the more difficult it is to make progress, and while we may congratulate ourselves upon the fact that we have made progress in the cheese and butter industry, we must face the fact that our problems have increased.

Coming down on the train I met a friend I had not seen for about twenty-five years, and he stated to me that about thirty-five years ago my father called at his place to sell him a machine called the old Joseph Hall Reaper, which cut the grain, but you had to have a man to rake off the sheaves. He stated that he never forgot the remark that my father made to him. He said, "I tell you it is simply impossible to improve upon that machine." That was his attitude at that time. It was then thought to be simply impossible to improve upon that machine. But you all know that the most decided improvements have been made, and some of you may say it is impossible to further improve the quality of Ontario cheese. I believe we have just begun to make improvements along this branch of agriculture. In fact, in a great new country like this, it is possible we have only just begun to make improvements along all lines of development. See our mines and our transportation. We read in the papers to-day that there are possibilities of gold being found in paying quantities up in Northern Ontario, and you know what they have done in silver. You will see a great many more railroads and trolley lines in the near future, and the same thing holds good in dairying. We are just beginning to make advances. What does advancement depend upon? It depends upon the quality which we aim for in our work. Progress will depend upon whether or not we improve the quality and set up standards and maintain them; and if we do that, Ontario would become the breeding ground for live stock in the Dominion, and the same thing would be true of seed production. We would be the great seed producing Province in this Dominion if we followed the instructions we are receiving. Our problems will be more numerous and more difficult with the raising of our standard. We cannot remain stationary, and it is not usual for Canadians to say, "We will retreat." Therefore, we must go ahead.

So far as the producer is concerned, I shall not mention but one or two of the many problems which face him. The great problem for the dairymen of Ontario, to my mind, is cheaper production of milk, whether that cheaper production consists in cheapening of the feeds or weeding out of the cows. By keeping up the quality of the milk, we cheapen the production. A little extra care in the handling of the milk means a greatly increased product, provided you can get all patrons to take equally good care of the milk. Makers should be better equipped for the responsibility which rests upon them, and we believe that when we put into effect the granting of certificates, that men will be attracted to the industry in large numbers. Factory owners are showing a desire to establish their business upon a permanent basis which indicates that they have confidence in the future, and we trust they will adopt means whereby larger factories will take the milk from the larger areas. Surely the dairymen will see the fallacy of establishing small factories which are not large enough to support a man who is capable of making first-class cheese. A maker cannot afford to spend his time in some of the small factories which are established in Eastern Ontario.

I believe the factory owner has something which increases in value. Farm produce is increasing in value, and these prices are likely to be maintained for years at least, and the people generally are coming to appreciate more and more the value of dairy products as a food. As compared with meat and other articles of food, there never was a time in Ontario dairying which called for greater vigilance than the present. Not only do makers require scientific training, but the producer must be something more than the mere feeder and milker of cows. He must have a knowledge of up-to-date methods of herd improvements, and the cheaper production of feeding, and scientific methods of handling and cooling the milk, and he must be a financier. A man to be a successful dairyman must compare favorably with some of the so-called large businessmen. They require to have capabilities along various lines.

Without co-operation between the Department of Agriculture and the makers and producers, we will not have that progress which we are looking for, and I therefore appeal to you to be frank to us in the Department, to be frank with the Association, and to be frank with each other, and we will see even greater progress in dairying than has been in this good old Province of Ontario before. (Applause)

ANOTHER YEAR IN COW TESTING.

By Chas. F. Whitley, Ottawa.

We are as yet simply at the threshold of cow testing, education in this matter is a gradual ripening of experiences and necessarily slow.

Records considered simply as an accumulated mass of figures are of but little value, one must be alive to what they suggest: they form a real study in black and white, and need to be approached with a mind hungry and thirsty for the valuable and meaty lessons they contain, easy of digestion and ready for assimilation.

1. *Why keep records?* They are a distinct mark of modern times, and business like. Every business-like farmer keeps accounts, on the same principle that he enjoys modern machinery, good plumbing in his house, a top buggy and telephone, and travels in a comfortable railroad car instead of a ramshackle old stage on a muddy road.

Dairymen are beginning to realize that they are managing a somewhat intricate business, a real manufacturing establishment. Profit depends on skill in management as applied to constant watchfulness in keeping down expenses. This means no trusting to vague estimates, but careful figuring, so as to employ only economical up-to-date methods, suitable cows. Passenger engines are not for switching cars in the yard limits, small freight engines are not for express passenger runs. The dairy type of cow is needed.

Several recent sales prove that with records available for inspection the stock sells for a higher price.

We need far more front rank cows, too many have just been loafing in the awkward squad marking time, they want moving along at a quick march into active service.

The irregularity of many individual yields of milk and fat is called attention to by records. Cows have evident preference for some particular milkers. Tests vary considerably from several known causes and some unknown. A low test does not necessarily mean more cream for the porridge that morning, or an open can on the milk stand during a rainy night.

Records promptly inform the owners which cows are "off their feed." Illness may thus be given warning of approach and serious trouble be averted.

Records train one's sense of observation. The most successful dairymen are those who perceive the obvious facts that surround them. One man sees quickly if anything is wrong with a cow, the unobserving owner wakes up some morning to the fact that the cow is nearly dead. The one is careless and deaf to speaking facts, while the other studies what cows need and why. He reads and profits by his own and others' experience, so that he makes more—doubly so, in that while feed and living expenses are higher, his cows produce more and his farm improves.

He takes stock in a fairly correct fashion so as honestly to face facts and present conditions. Thereby he makes useful comparisons, with previous years' practices and results, with the practice of his own locality, and with the practice of the best men and localities. Good records are always encouraging. One man at Scotsburn, N.S., has in three years actually *doubled* his average yield per cow. Several men in Ontario point with pride to records of over 1,000 lbs. milk and 40 lbs. fat per cow for four or five months running. British Columbia owns cows giving 1,900, 1,800, 1,700 lbs. milk for three consecutive months. The stock-taking again aids in training the faculty of observation, the review of past events acts as a spur to further endeavour, inducing foresight.

Such observation of records shows the cash value of cow testing associations, it confirms or dispels suspicions of there being some poor cows in the herd, it shows if any are robbing one steadily of a large share of the profits, it gives definite knowledge about every cow in the herd, and such knowledge pays handsomely. Many herds exist, for instance, where the profit from the best cow is equal to the profit from the combined efforts of the six poorest. Is it not an absurd condition of affairs that will keep a man unobservant of the fact that he is at all the expense and has all the labor of keeping six poor cows, where one is just as profitable?

Dairy records thus assist in quickly building up a highly profitable herd.

CHART NO. 1.—COMPARATIVE YIELD OF 248 COWS IN 18 HERDS FOR FULL PERIOD OF LACTATION, ONTARIO.

Average, 5,985 lbs. milk; 3.5 test; 211.7 lbs. fat.
Average of 18 best cows, 7,733 lbs. milk; 3.3 test; 258.3 lbs. fat.
Average of 18 poorest cows, 4,206 lbs. milk; 3.7 test; 156.8 lbs. fat.
Best individual, 13,742 lbs. milk; 3.4 test; 472.4 lbs. fat.
Poorest individual, 2,670 lbs. milk; 3.5 test; 94.9 lbs. fat.

Chart No. 1 illustrates graphically a few comparisons in the yields of 248 Ontario cows. The average yield, close on to 6,000 lbs. milk, is too apt to be taken as indicative of good all round cows. It comes as a shock to find that two such extremes as 13,740 lbs. and only 2,670 lbs. are included. This shows immediately how thoroughly one can be misled by ignoring the fact that an "average" institutes no comparisons, but simply a comforting blanket thrown over the cold deficiencies of many a delinquent. An average in connection with herd yields should immediately awaken enquiry as to what is included; otherwise, and frequently to one's loss, cows under the 3,000 lbs. mark may creep into undeserved credit amongst the 6,000 pounders.

On the other hand, such individuals as this 13,000 pound beauty are likely to be completely overlooked. Their light is literally shining brightly, but the befogging average drops a bushel basket over it.

Between the 18 best cows (one in each herd) and the 18 poorest there is a difference of over 3,500 lbs. milk. This illustrates what is the actual difference in efficiency between cows in hundreds of herds to-day, and points to the absolute necessity of taking careful notice of each cow's performance separately.

Some men object to the price of the outfit for weighing and sampling, but for the trifle of cash he expends the member receives many benefits: the records of his own herd with all the wealth of information they contain, the opportunity to compare results in other districts with his own and profit by the comparison, the advice of government officials constantly travelling round the farms, and the discussions at monthly meetings. Cow testing associations are thus practical in operation, economical in cost, educational in scope and profitable in results.

The few minutes a month spent in recording may save from a bad bargain. A member bought five cows at $25 each, thought and said to be "no good," yet one gave 10,000 and another 13,000 lbs. milk. The unobservant man may lose money. Another member bought two cows at the same price, one gives actually twice as much butter-fat as the other, and the poorer was thought by the seller to be the better cow. Records save money.

2. *Records indicate that we can easily increase considerably the number of cows kept, the average production of each cow and each acre, the revenue per cow and per acre, and the net profit.*

The consumption of milk and its products is steadily on the increase and the demand for good cows is not falling off, so that with increasing population no "over-production" bogey need scare us. Ontario at present has 7 cows for every 100 acres of cleared land; with suitable crop rotation ensuring abundance of succulent feed, there could easily be four times as many cows. A great railway magnate has predicted that the United States will soon have to import wheat! We need seriously to enquire if our methods tend towards an increasing revenue per acre, from better seed, better methods, bigger crops. Our cows must be fed; bread and cheese is still demanded in England, and fancy butter here.

A low average return holds back real progress and cheats men out of genuine success. Such good averages as 8,000 lbs. milk from 50 cows, as obtained by a man near Ottawa, should help to instil ambition in other minds. This maxim might well be heralded to every farm: Don't figure on how little profit you can "get along with," but "how much profit" can you make. Get the utmost possible from each cow.

The total yield of milk is largely influenced by the training to a lengthy milking period. This naturally begins with the first season of the young stock. Our records show a very large proportion of cows dry in eight and a half and nine months. They could easily work another six weeks. Many that calve in March are just dribbling along in September and go dry in October. Can any business stand that proportion of spare time? Could a store, usually open ten hours a day, Monday to Saturday, afford to remain closed a day and a half, and not open for customers till one o'clock Tuesday afternoon instead of eight a.m. Monday?

The very fact that pasture may be scarce in August should lead the observant dairyman to provide other feed. Shrinkage in milk yield and smaller factory cheques can be largely prevented. Good records around Ingersoll were made on a farm where there was no pasture after the middle of July, but where forehandedness had the summer silo stocked, where alfalfa, corn and oil cake played an important part.

Some Ontario records showed cows giving 1,000 lbs. milk in September, but only 460 in October; or again, 520 lbs. in September and actually dry in October; while in contrast to this some Quebec records noted a positive increase in September milk over August of 63 per cent.

We need to digest the fact that cows all around us are being educated to give 8,000, 10,000, 12,000 lbs. and upwards of milk. We have been contented too long with a dipper full when we should have gallons.

How much profit per day do your cows earn? There are hundreds that do not earn one cent per day; even allowing only $25 for cost of feed. Some have to be fed seven or eight days to pay one cent profit over cost of feed. Roughage and grain cost, perhaps, 5c., plus 5c. for maintenance, and the cow just exists, yielding scarcely 3,500 lbs. milk; but if her individuality and dairy characteristics warrant it, she may have an extra 8c. worth of feed and be coaxed up to an annual yield of 300 or 400 lbs. fat. Some cows, it is proved, have had $20 worth more grain, and have given $40 worth more milk. Feed, therefore, to tip the scale of profit well down. Do not try just to balance the beam. To keep 15 or 20 cows just alive, but dead to any ambition of productiveness, is not profitable; better by far only keep ten, each one a hummer. We need cows that are blessings, not calamities. Their conversion depends largely on watching records.

Chart 2.—Comparisons of the One-quarter Best and the One-quarter Poorest Out of 524 Cows and 86 Herds in 22 Ontario Associations.

Average Yield, 5,870 lbs. Milk, 3.5 test; 206.4 lbs. fat.

	131 Best Cows.	131 Poorest Cows.
Average Yield............................	7,893 lbs. milk.	4,197 lbs. milk.
“ “	282.6 lbs. fat.	145 lbs. fat
Gross Receipts (Fat 24c.)................	$67.68	$34.80
Cost of Feed.............................	34.00	34.00
Profit Per Cow...........................	$33.68	80 cents.
Total Profit.............................	$4.412 00	$104.80

Thus, 25 good cows made as much profit as 1,050 poor cows. It took 456 poor cows to make a profit of $1.00 per day!

Chart No. 2 presents some facts in a somewhat new light. Taking 524 cows and leaving out half of them, those that come nearest to the average, the remaining half is divided again so as to compare the one-quarter best and the one-quarter poorest. It will be noticed that in the fairly satisfactory average yield of 5,870 lbs. milk the poorest cows are included, but they give only 4,197 lbs., or in other words, they are credited with 1,673 lbs. more than they actually gave.

This, again, is where averages are likely to be quite deceptive. Taking simply the value of product and the cost of feed it is seen that the poor cows gave only 80 cents net profit on their year's work, while the best cows gave over $33 net profit.

Calculating it another way, a herd of 25 selected cows made as much profit as 1,050 of the kind that are allowed to pension themselves on the unsuspecting owner. This is the kind we cannot afford to keep—no one can. One would have the colossal task of handling 456 of such calibre to make the astounding profit of only one dollar per day. This must surely open men's eyes to the absurdity of permitting such harpies to prey upon them.

3. *Without a knowledge of the cost of feed per cow, the milk record stops just short of its logical outcome.* Does a cow consume $25 worth or $45 worth? Or, what net profit does each cow bring? If crops are sold on the market the cash return and the profit are easily calculated, but if the crop is marketed through the cow as milk, where does one stand? Is each cow worthy your attention and thought, or is she simply a makeshift?

Records enable one to ascertain the profit made by each cow. Some are apparently not capable of giving any profit at all. Large numbers are left to browse contentedly in the residential section of many communities;they need moving up to the business district. The extraordinary variations in this respect suggest the need of vigilant study of individual performance. The business-like cow, the one returning a large profit, is the kind needed on every farm. She is to be found in increasing numbers only where careful records are kept.

From feed worth one dollar, five cows in a herd gave milk worth 70 cents, 89 cents, $1.20, $1.49 and $1.70, or a variation from a bad loss up to 70 per cent. return on the investment. Many farmers loan money and expect good interest, but with cows it seems different, feed is loaned and no returns looked for.

A storekeeper would be running on a loose principle if he said, "I have sold a few kegs of nails, a chest or two of tea, and a good many pairs of boots, and have taken in plenty of cash this year. A lot of goods have gone out on credit, but I did not bother keeping track of who got them; some will come in any pay up. Possibly some won't, but I don't lose much." It is precisely so with cows. Too many have had extended credit, their bills are long overdue; some are regular "dead beats" and will never pay.

Feed records give most valuable information regarding the capacity of each cow in the herd, at the same time enabling one to feed economically by adjusting the character and quality of the feed to individual tastes and requirements with the object of obtaining the largest possible net profit. A cow may produce milk at a cost of 90 cents, or $1.25, or even $2 per 100 lb., but another in the same herd may give her owner the benefit of such a low cost as 70 cents, or 63 cents, or even 50 cents. This is where records are of immense value.

4. *Dairy records prove conclusively the marvellous value of a good pure-bred sire.* Every dairy farmer ought to be keenly alive to both the value and economy of using only dairy sires for dairy purposes. Special dairy quality is a marked feature of some breeds and some families, their power and perfection come by reason of having been bred with a definite purpose in view from long lines of ancestors of like quality, veritable dairy kings and queens. Then, if breeds are crossed, or grades used on grades one can only be working at random, worse than that, actually demolishing the painstaking and patient building of the intelligent breeder who for years has striven for definite improvement. What can be expected of a "scrub bull"? The very name, a term of reproach and contempt, is an instant index of his utter worthlessness. It is a good investment, an excellent one, and will pay better than anything else on the farm, to put $150 into the right kind of dairy sire, for he will return practically ten times $150 within three years. There will be a gain in milking capacity of his daughters of about 1,000 lb. milk over their dams worth $10 a year. They are likely to be more

persistent milkers, while there will be a marked improvement in the general efficiency of the herd, as the good blood, the better breeding, accumulates. Quality will be remembered long after price is forgotten.

Men seeking real herd improvement should co-operate; 15 or 20 men could club together under a six-year agreement and purchase three good bulls. With the herds in three groups, the members of each group could have one bull two years; then redistribute the sires, and at the end of second two year period change again. Thus there is the use of three good sires for six years each at far lower cost than if each man bought one himself.

Pure dairy type is of utmost importance. Some breeds or animals may produce milk and beef, but not with economy, and net profit is our object in view. A trotter is not expected to haul a load of hay, nor a pampered pug dog to go deer hunting—economic milk cannot be expected from beef type. The sire must not only be pure-bred, but he must be a *good,* pure bred. Mere entry in a herd book is neither a guarantee of personal excellence nor a sound reason for a lofty price. See that the dam and grand dams have been fine producers, and that the sire is a good individual of dairy type, not coarse and beefy. Do not worry delving the archives for records of five or six generations ago. It is the *immediate* ancestry that counts.

The carefully selected sire should be used as a mature animal. A youngster is not ready for general or extensive use till three or four years old, about the age many are killed, but he can continue until ten or twelve years of age at least. Of untold damage, most serious detriment to herd improvement is the young, immature scrub sire running loose in a herd.

Co-operation should rapidly be practiced in this respect. It already is applied, for instance, in hauling milk and exchange of work in filling silo, and can be profitably utilized in the purchase of good sires.

Of mere man, Shakespeare wrote: "The evil that men do lives after them, the good is oft interred with their bones," but fortunately with the mother of agriculture it is not so. The poor cow is forgotten; the good is recorded. Judging by the broad foundations now being laid by our records so recently commenced, one may confidently predict that future students of dairy conditions the world over will be amazed at the excellent attainments of dairy cows in Canada.

SENATOR DERBYSHIRE: There is the best address we have ever had delivered at any of our conventions. (Applause.) It is practically up to date, and from first hand. He is talking about something that he knows, and I think we ought to question him a little.

THE CHAIRMAN: Have you any information as to other countries that have adopted this system?

MR. WHITLEY: That would be a long story to tell. Other countries have led us in this kind of work, and countries that have taken it up eight or ten years ago have made extraordinary records. You do not expect the Swede to be a high class dairyman, but I do not know of any country in the world that has forged ahead more rapidly than Sweden. They have been at this work ten or twelve years, and they have improved their yield per cow marvellously. They have improved steadily the whole time. They have large herds of cows in Sweden that put our records to shame. This work is spreading rapidly through all the northern sections of Europe, Sweden, Denmark, and Switzerland. In this country the Dominion Government bears the cost of the testing. It is absolutely free to the farmer, while on the other side men do not hesitate to pay $1 per cow for the information that you are getting here for nothing.

Senator Derbyshire: Have they any cow testing associations in this county?

Mr. Whitley: I regret to say we have not any in this county. Any man who wants to begin the recording simply has to begin, and the Department will furnish you with record forms, and all you have to do is to put down the weight of the cow's milk, morning and evening for three days during the month. You then take a little dipper and put a sample of the milk in the bottle that has preservative in it, and when you have the six samples and the box full you send them into the factory for testing. That testing is done free. The only expense a man has is that of providing himself with scales and a sample bottle, which only costs about six or eight cents for each cow. I do not think you get the best results by weighing three times a month. We have a large number of men who are weighing the milk every day, and by doing that you can tell at once if there is anything wrong with the cow, and you can look for the cause and quickly remedy it.

Q. Do the patrons work out the amount of milk?

A. That is done by the Department free of charge.

Q. Are the farmers weeding out cows who are making these tests?

A. Yes, that is one encouraging feature of this work. Month after month we get these record sheets saying a cow "sold for beef" or sold to John Smith, "he thought she was all right."

Q. Do they keep records of the feed?

A. Yes; this work means millions of dollars to the country, and it means a higher type of farmer altogether.

The Chairman: I would like to add a word or two giving a slight experience I have had during the present season. I am not able to give personal attention to the care or milking of my own cows, because I am sent around the country so much that I have to leave that work to my herdsman. I asked him last spring if he would take the trouble to weigh the milk every day and he said yes he would gladly do it. I promised to obtain blanks for him, but I delayed doing so, and he got so much interested in it that he went to work and prepared his own blanks, and he has kept a record of the cows. I have not anything to boast about, because it has not yet reached what I hope it will in the future. But what I feel sure we will do in the future is that we will make a very great increase, because we can already see many advantages in what has been done this year. We have found out that some of the cows we thought were our best have had to take a second or third place, and some we imagined were only second raters have gone up to the front. We have found out that there was not much trouble about taking the weights, and we have taken them every day. I find that the milkers become very much interested in this. We have some three or four milkers, and they have been trying to see how they can keep up their cows and make larger returns. I am sure there are men here who know much more about it than I do, and they will agree with me that apart from the feeding of the cow and apart from the breeding of the cow there is a great deal in the milker. I believe that the dairymen of this country are a little careless right on this point. They think anybody will do to milk the cows, but I have found that there is quite a difference in milkers. I believe that the account we kept this year was of great advantage, and I believe that next year we will commence with better milkers than we did this year because I believe that they learned something. I was astonished when Mr. Publow showed me the returns of the cows in Eastern Ontario for this year. It was only a little over 2,800 pounds, and I felt very much discouraged. It is altogether too low; it is not over half what it ought to be. My cows were nothing to boast about, they were rather poorly wintered last year, but I got an average from them of over 5,000 pounds. I am not at all satisfied with it and I believe another season that I shall increase that in the neighborhood of another 1,000 pounds per cow and I believe I can do it without any extra cost. But between the average and mine there is a long way, and it would mean an advance of 50% in the returns that would come to the dairymen of this country.

We are all interested more or less in one another and what means prosperity to one means prosperity to us all. We are all interested in the prosperity of the country and why should you not all make up your minds to do better next year, and there is nothing in the world to hinder each one of you from testing your cows.

We have been in the habit of breeding from any cow. I quite agree with what has been said as to the advisability of having a pure-bred sire at the head of your herd. I have been doing that for years, and I can see the advantage of it. By keeping these records I shall know next spring what cows to save the calves from far better than I ever knew before. I believe the dairymen of this country can breed from the very best cows in his herd, and by doing so in time he would have just as good a breed as could be procured from any of pure breeds. I would not advise that method because it would take a long time, but I would strongly advise every dairyman to get a pure-bred sire, and never think for a moment of keeping a herd of cows unless you have a pure-bred sire of your own, unless there is one in the neighborhood. In our locality a number of farmers commenced doing that, and the results are plainly visible. I have neighbors who have been keeping records, who are now sending 8,000 pounds per cow, and that means that some cows give a great deal more than that; because I need not say that there are always some young heifers that bring down the average. I would very much like to have every dairyman here resolve that in the coming year he will keep track of the weight of every cow's milk every day during the season.

Years ago, Prof. Robertson made the remark that if every man who was keeping dairy cows would only keep an account of the amount of milk each cow gave there would be no necessity of having a dairy department at Ottawa. The people would become so educated that there would be no necessity for disseminating knowledge from Ottawa. I do hope and trust that you will take that splendid lecture that we have heard from Mr. Whitley and govern yourselves accordingly.

The next number on the programme is an address from a man whom I am sure needs no introduction to an audience in Belleville. It is not very often that I set out to criticise the Ontario Government, but sometimes I do; and whenever I think of Dr. Publow and the loss this country has sustained by his being allowed to leave the Province of Ontario, and that his service should be lost to the Province of Ontario I feel pretty sore. I am sure that any of you who have known of Dr. Publow and what he has accomplished for dairying in Eastern Ontario will agree with me that this Province has sustained a loss in his removing to the United States, and I hope we will be able to place some kind of embargo upon him to prevent him returning to the United States. Of course they have sent over a couple of men to guard him for fear he will be kept here, and I say to these gentlemen who have charge of him that we are bound to have him back, and will give them fair warning that sooner or later our Ministers will appreciate the loss they have sustained, and they will wake up to the fact that they need such men as Dr. Publow.

DAIRY EDUCATION.

By Dr. C. A. Publow, Cornell University, Ithaca, N.Y.

I think it is about six years now since I was first called upon to make an address in the city of Belleville. Many times have I thought of the day when I visited Belleville Cheese Board when our good friend James Anderson was present, and being a pretty young fellow then, as they say I am even now, I got in a back seat where no person could see me, because I was new in this district. But I was not sitting down very long when Mr. Anderson pulled me out, and got me up to the front for a speech. I remember quite well that I did not see a thing from the time I left the back of the hall till I got up there, and I did not see anything after. I never knew what I said, but I watched for a hole in the floor all the way up and back so that I could get right into it. I therefore appreciate the kind remarks the Chairman said in my behalf in opening the meeting to-night.

However, I feel somewhat relieved in the remembrance of statements made at previous conventions by our honorary President, Senator Derbyshire, to the effect that American speakers were not brought over the line to give us information, but simply to talk, tell stories, and keep up a correlative custom already established. Representing as I do then the American dairymen, I regret exceedingly that I cannot give you the storm and pathos of the American orator, but what I may have to say I must ask you to accept in the simple words of a Canadian boy, who received his training in Canada, and who has not forgotten the interests and welfare of his own country.

Dairy education. What a subject! How many of us ever realize the tremendous importance and extent of this industry that both educates and seeks for education? What an impressive thing it is to see the interests that not so long ago were strictly rural, now being spread to the towns and cities and into the very homes where the least has yet been done but where the most remains to do. The age indeed has surely arrived when necessity demands that not only the farmer but his family and employees, the city man, the merchant, the doctor, the mother, the child, and the mistress of the kitchen all must have a certain amount of this useful knowledge which we include in dairy education. It is my wish to-night to consider this subject in its relation to not only the commercial world but to the social, sanitary and domestic life as well.

Few of us when we look at a herd of cows pasturing in the green fields ever think of anything but cows and milk. Yet, the history of cows and their development through the ages of domestication is one of the most interesting of all agricultural studies. A few centuries ago, cows did not grace the yards of dairy farmers, and their product was not manufactured into such articles as it is to-day. While cows have been mentioned frequently in early history, it is only in comparatively recent ages that they have been of any appreciable commercial importance. On the other hand, the cow represents one of the early types of wild animals. Roaming the prairies of this and other countries they existed and multiplied in their wild state, being provided for solely by the growing elements of nature. They were not bothered by man for eleven months in the year; their only duties were to care for themselves and to furnish sufficient milk for the nourishment of their young

As time went on, however, the cow became a necessity for man in a new way. Instead of having to furnish food for her own offspring she was obliged to furnish nourishment and growth for the children of man, and as is frequently stated, in this latter accomplishment she has become the foster mother of the human race. Many and wonderful indeed are the results obtained since the domestication of this useful animal. Giving originally only a few pounds of milk per day for only a few months in the year, she has through the skill and science of man become so productive as to give as much as 30,000 pounds of milk in a single season. Entire herds that secreted so little milk that its value was below the cost of the feeds consumed, have through such educational means as daily records, testing-associations and cheaper and better foods become so highly profitable as to pay off more farm mortgages than any other one factor, and to be responsible for the greatest amount of prosperity in the most progressive of the civilized countries.

What a simple, common insignificant looking substance milk to all appearances is, and yet what product of the farm is more valuable when properly treated or the cause of more trouble when subjected to abuse. Consumed by the infant, it nourishes him and builds him to manhood more quickly and more efficiently than any other food. Consumed by the invalid, it gives new strength and restores the life that otherwise would surely perish. Controlled by the art and genius of man, it is manufactured into more products than is any other natural liquid, forming raw material for some of the greatest industries in the most progressive countries, constituting food for the millions, and labor for an equal number. This, ladies and gentlemen, is the white, opaque fluid that brought us to a smile when we cried in infancy, and which also brings us to this convention to-night.

Education produces many results. It makes some of us better and some of us worse, but education to be useful must enable us not only to do things better but to do better things. Education is to man what eyes are to an animal, and the love of knowledge for its own sake is the principal part of human perfection. We have mentioned what dairy education has done for the cow. Let us consider what it has done for some of us.

There is no better monumental evidence to the fruits of dairy education than right at the farms themselves. Here we find substantial buildings, attractive homes, and all the evidence of prosperity that comes from knowing how and doing things. We go a step farther to the cheese factories, and we find the best buildings being managed by the best cheese-makers in the world. Come to the city and you find everyone catering to the men who own the cows. The banker is their servant paid to handle their surplus cash, and the merchant awaits their pleasure. These are the commercial conditions that have come from winning and holding in the midst of keenest competition the preference in the dairy markets of the world.

In the midst of prosperity we sometimes forget the cause or source of our good things, but there are a number of our educational dairy organizations which we cannot forget and to whom an unlimited amount of credit is due. Your staff of dairy instructors who visit the farms and factories constitute the greatest and most useful organization of its kind, reaching as they do the vital places from which success must spring. The dairy schools that graduate annually hundreds of the brightest boys, learned in the details of their own profession, the departments of agriculture with their money and able direction, dairy literature and publications, and not by any means the least, this association, whose value to the agricultural communities can never be estimated, all combined and working in harmony for the best interests of the people on the land. These, ladies and gentlemen, are the agents that through educational means are establishing and maintaining the commercial prosperity of the dairy industry.

When we were younger, some of us went to school because we enjoyed it, others because we were forced to. I have done both. To some of us the word education does not stand for very much, and to others its value is unknown. Things that we get easy we value least, good things come slowly and are always prized. Schools are made to educate and train the mind, but there is one school whose existence we too often forget. How many of us ever stop to consider the great school of life in which we are constantly being taught, where the subjects include those of nature, the human being, the animal, the plant, and where our best teachers are experience, fortune and misfortune, the struggle for existence and love? I tell you friends, we forget these things. Of all the so-called education I have had, the part I appreciate most, has come from this great sky-covered school, and the greatest part of it has come from right here in this district where my classmates for five years included the men who milk the cows.

This class is still going on, and there are many things yet to be learned, not so much in the rural parts, but in the towns and cities. How many of our city people know the actual food value of milk, butter and cheese in comparison with the same amount of meats or other foods? How many understand the meaning of such terms as certified milk, clarified milk, pasteurized milk, ærated milk or any of the other terms printed on the wagon of the milk dealer? How many of our city women know exactly why milk sours and how such a change can be prevented? The facts are too true the number is small. These are some of the things that dairy education must teach. The housewife must learn that she cannot leave milk on the doorstep for hours in warm weather, that she cannot put new milk into old without encouraging the souring of it all. She must learn that it is not always the much abused farmer who is to blame for the bad milk or cream and the illness of the child. Indeed it can well be said, the care of milk in the household is one of the big problems for dairy education in the future.

All of us were infants at one time, and most of us were obliged to drink milk whether we wanted to or not. But in these later days all infants are not so fortunate as some of us have been. It has been estimated that owing to the effects of fashion both in dress and living, over eighty per cent. of modern mothers have become so affected physically or mentally that they either cannot or will not nourish their young by the means provided by their great Creator. On the other hand, over ninety-five per cent. of all infants must depend for some time at least upon the motherly qualities of the old cow, and she does her part better than either woman or man. Probably man is the worst. Milk never was intended to see the light of day. It was intended to pass directly from the mother to the young for nourishing purposes only, and when this great natural law is violated we immediately find physical depreciation in both human and animal life. The inefficiency of man is most noticeable in our large towns and cities where during the last ten years, of every 1,000 infants born 40 have died during the months of June, July and August from defects in the milk supply, defects due to carelessness and ignorance of some of the many persons who handle the milk from the time it leaves the cow in its pure state until it reaches the consumer. But the death rate is not all. Physicians and mothers too well know the extent of the infantile diseases brought on by impure milk. Then we have the typhoid epidemics that constantly break out, due directly or indirectly to impure milk infected during its handling by man.

But with the bitter we always have the sweet, and we find great successful efforts being made to overcome or avoid these conditions. In some of our cities we find these so improved that the mortality rate has been reduced over 400 per cent.

One can appreciate what this must mean to a great city like New York, where over two million quarts of milk are consumed daily, and where an infant is born every eight minutes during the day. It is not necessary, however, to go to New York, for we have our conditions right at home, and no field offers greater opportunity than does this one concerning which the recently appointed Milk Commission of the province must make its report.

It may be that a certain amount of legislation must be used in accomplishing our best results, but legislation is education in the best form if it teaches how things are to be accomplished and then demands that they are.

Substances that are dead are easy to analyze, but where life is concerned our problems are great. All our efforts and successes, whether they be in the laboratory or on the farm, depend solely upon the question of life, whether it be animal or plant. This is why our research and our study always bring complexity, and why dead persons cannot cope with the live problems of the day. Knowledge is or ought to be power, and we have only to go to those localities where men know most about their industries, to find the greatest power, both financial and mental. This is why the efforts of the dairy educational institutions are reaping power. Knowledge is being carried to the people in so scientific and practical a manner that originality and thought have been awakened. We find the things that were old being renewed, and the things that were unclean becoming clean. The teachings that have applied only to milk and its care are being carried and applied to other problems in the sanitation or cleanliness of domestic life. Indeed, it is doubtful if we can ever estimate, not only the direct but the indirect influence of our dairy teachings upon the general hygienic surroundings of rural and city life. My own opinion is that in recent years no greater blessing has come to the people of our land than this unheralded one of dairy education.

THE CHAIRMAN: The next number on the programme is an address from C. C. James, the Deputy Minister of Agriculture for the Province of Ontario. (Applause.) It has been said that a man who makes two blades of grass grow where one grew before is a public benefactor. If so, Mr. James is certainly a public benefactor, because I can say without fear of contradiction, and knowing something of what I say, that there is no man in the Province of Ontario who has done as much for agriculture and agriculturists and dairying as Mr. James. (Applause.)

ADDRESS.

BY C. C. JAMES, DEPUTY MINISTER OF AGRICULTURE, TORONTO.

In many ways we are making very slow progress in this Province. We have been talking of agricultural education and of the development of agriculture for over twenty-five years and every once in a while we state that we have been making progress. We have made some progress, but the more progress we make, the less we seem to have accomplished because it has an ever-widening horizon. There is no other field of work in the Province of Ontario that has no limitations. You can overdo the iron industry, and some people have told us that you can even overdo the cement industry. Take any line of manufacturing in Ontario or the Dominion of Canada and you can develop it so that you will put it beyond a profitable undertaking. But no one yet has dared set any limitation to the development of our agriculture. The higher up we get the farther on we can see. That is why I say that, after all, we are making progress very, very slowly.

Some people think that we are making wonderful progress in this country. I saw a statement in one of the Montreal papers the other day that there are now one hundred millionaires in that city, and it gave a list of those that have been added during the last year. "A list of men and women in the city of Montreal who this last year have joined the ranks of millionaires." Some people might say, "that is a wonderful thing."

I had the privilege this summer of spending a few days in a couple of countries where there are very few millionaires, but I never visited any country where there was such general happiness and contentment and satisfaction as I saw there. I refer to Denmark and Sweden. There were not many millionaires—you cannot avoid a few in the natural outcome of events—but there was little or no poverty. There you saw an even distribution of wealth that resulted in everybody having enough and the people being fairly well satisfied with what they had. The people were all educated and intelligent, working together, a happy, contented people.

And I said to myself, "This is better than making millionaires. There is something in this country and the working out of the operations set in force, that is far better than we have across the Atlantic, in Canada and the United States, where everything seems to conduce to the production of a few—in fact more than a few—a great many millionaires." There is something worth turning over in one's mind along that line. If the development of our resources and the working out of human operations in this country and the country across the line is merely towards the building up of immense fortunes, I think it would pay us once in a while, as a people, to sit down and consider some of these questions.

Supposing each of us were to write down what we wished for Canada, for the people as a whole, for this year, would any of you wish that it could become easy for a few people to become millionaires. (Cries of "No, no.") Would not that be about the very worst thing that we could wish for the people of this country?

What are we doing? We are not writing down that wish, but is not that what we are doing? Isn't that what the people of this country apparently are concerned about? Or isn't it becoming comparatively easy for that to be brought about?

Someone else writes down, "I would wish that the health of the people of Ontario could be assured, that we might become healthy, strong and vigorous in mind and body." Are we doing much as a people to accomplish that? Certainly within the last few years, but only within the last few years have we become aroused as a people to the importance of public health.

President Roosevelt in one of the most important things he ever wrote, said, "The national health is the greatest asset of the American people," and someone answered that to this effect: "That the United States gave or spent more money looking after the good health of the horses and cows and sheep and pigs than the good health of the human beings of the United States." Of our public expenditures, we have been spending more money in looking after the general health of the animals upon our farms than the health of human beings on the farms. But we are becoming awakened to the importance of that, and so we see all over this country, this question of public health is being taken up and considered and men who never thought of it before are being directed to the importance of it. The result is seen in hospitals and institutions for the care of the sick, institutions for the investigation of tuberculosis and other diseases. This is a movement that certainly ought to receive the support of the people as a whole.

Supposing we were to sit down and write this as a New Year's desire, "That all the people, individually, might prosper," would not that be better than that a few individuals might prosper at the expense of the multitude? If you gave any sane man the choice between these two, as to whether the few shall be improved or the many shall be improved, there is no question whatever as to which one will be selected, and yet are we doing all that we might for the general improvement and development along financial lines?

What are we doing to help the farmers, the dairymen, the live stock men, the poultry men and the fruit men? $750,000 was the figure we reached for the Province of Ontario the year before last. Someone would say, "That is a large sum." It is about 30 cents apiece for the people of the Province of Ontario. We have over two million and a half in Ontario, we are approaching three million and we are spending 30 cents a piece in trying to help the farmers in this country make a better living. Someone will say: "That is enough; why should we help the farmers of the Province of Ontario?" And a number of answers can be given to that.

I picked up a paper to-day and I saw that $120,000,000 had been left as public benefactions last year, in the United States. That was spread all over the country. It was not given for Agricultural Colleges and Agricultural Institutions. It was spent in the towns and cities. When you find one of these wealthy men of the United States and Canada or Great Britain or any other country putting down a few millions of dollars to help the agriculturists, you can mark that underneath in red. It is the exception, it is the rarity.

Now, this enormous wealth that is coming to these people who make these benefactions is coming to a large extent out of the farming community, but it does not go back there, except indirectly. I have often thought that I would have liked to have had five minutes with Andrew Carnegie when he sat down to figure out his plan as to how he could die a poor man. He finally devised the plan of putting libraries in all the cities and towns in the United States and Canada and other countries. He overlooked the farmers. Libraries were all right for the people in towns and cities. He did not think that if he would only spend some of these dollars in the rural parts of the country that would produce greater results than ever could come from the cities.

The other point is this: It is not right to pick out farmers and help them from a charitable standpoint. We have no more right to help the farmer because he is a farmer than any other man. We have gotten past that. There might have been a time when the whole country was made up of farmers and no others, when the resources were limited and the capital limited; there might have been occasion in those days for us to dole out charity to the farmers of the country, but that day has long gone by. The time has come when we should look at this from a national standpoint, and consider whether or not it is worth while investing the money of the country for the benefit of the country in trying to increase and develop our agricultural resources.

We are beginning to see daylight along some of these lines. They appointed a commission to study the conservation of the resources in the United States this year, and following that up, there has been a commission to study the question of the conservation of the resources of Canada. It is now to be hoped that we will be able to get before the country as a whole and study from a national standpoint, the question of the importance of agriculture to the whole community. Unless it can be proven that the increase of our agricultural resources and the betterment of the farmers' condition is going to result in the general improvement of the whole people, my opinion is that we would not be warranted in going any further, in fact we would not be warranted in spending the money we are spending now.

What is the result of looking at this from a wrong standpoint? Nine men out of ten to whom you talk upon this question will say, "You are doing that to help the farmers." Somebody comes into your office. You are busy. She is collecting for such and such an institution and you wonder how much you can give, how small an amount you can give to that fund, and if you think you can get off with a dollar you will give it, and if it takes five dollars you give that. As a rule, the people of this country have not been trained to give to these charitable institutions with a very liberal hand. And so when we come to consider money for agricultural purposes, we have looked at it, to a large extent, from the standpoint of charity.

But if a scheme comes before the Government of Canada to build a railroad or dig a canal or build a bridge that is going to cost five, ten or fifteen millions, the money is voted and there is little or no trouble about it. The bigger the scheme the easier it seems to be to get the money.

J. J. Hill, the Canadian-American railroad magnate, wrote an article not long ago which has been quoted again and again, in which he advocated spending some of the enormous expenditure for the naval programme in building Agricultural Schools all over the United States, and that has been taken up by a number of important business men. They are beginning to get a new view of things.

The President of the New York Central Railway at a dinner given in New York in the month of November, took up that important point and enlarged upon it and advocated the same thing. President Brown, of the New York Central, knows that if the apple crop of the State of New York is increased by thousands of barrels that the New York Central will have to haul them. He knows that if the garden product is increased, the New York Central will get their share. He knows that if the small fruit crop is increased they will get their share. We are hoping soon to get the Canadian railroads to look at these questions from a similar standpoint. We are trying to do it, but it will take time.

What is the Grand Trunk Pacific being built for, and the Canadian Northern, but to profit from the farmers' work. The development of the great western country is going to mean a great deal for some people in this Province, in Toronto, Montreal and elsewhere. We are trying, in our humble way, to bring these people to understand that there are just as great, even greater, possibilities right here in the Province of Ontario. (Applause). Someone will say, "That is utterly impossible. Surely you don't mean to say here in the Province of Ontario you can grow more than in the Western Provinces?" Certainly we can. There is not any doubt about it. There are enormous areas out there that are good for nothing but wheat, and under present methods, that will play out one of these days. There are certain areas there where they can grow other crops, but you can go through counties, that we might mention, from east to west of this Province where they can produce more than they can produce in the Northwest. Take the country here around the Bay of Quinte. Do you mean to say you cannot produce here per acre more than can be produced on an average in the prairie lands of the West? You are doing it now, and where you are producing one dollar now, you can produce two and three, and if you get your farms up to the producing level of certain parts of France and Holland and Belgium and Denmark and some parts of Sweden and Norway, you can produce five dollars for every dollar you are producing now.

You do not have to go to California or Florida for examples of that. Go to these countries of northern Europe where the people have largely the same blood as we have, same climate, same soil, but hardly as good as ours. They are carrying on a work of a similar nature to ours. See what they are doing there and then sit down and you will very soon determine that the possibilities of increasing the production of our farms in the vicinity of the Bay of Quinte are almost unlimited.

You can easily see that this question does not concern the poor farmer so much as some other people; the people who have their money invested in railways, stocks and bonds are interested in the development of the agriculture of Ontario. The manufacturer should be interested. The increase in the development of our soils, the increase in our dairying, and the increase in our fruit growing is going to mean more employment, more machinery. And we will have to build over this Province more factories to supply this demand. What about the storekeeper? There is a concentration of storekeeping now that is affecting every town and village, and even some cities in the Province of Ontario. You know very well that in the stores of towns or villages near which you live, there is just one common need and that is trade. The men behind the counter are begging for more trade, and where are they looking for it? They get some, of course, from the people of the towns and cities, but let the crops fail and hard times come out in the country, and what is going to happen? The storekeeper is going to draw a long face and he is going to look again and again at his books and see if he cannot remedy matters.

Now reverse that and let the crops be good, and let money come in and the prices be up, and the farmers have plenty of money in their pockets. The storekeeper will go around with a cheerful smile on his face because good times have come back again. It is of most importance to the storekeepers of this country that agricultural interests should be enlarged. And all professional men, lawyers and doctors and ministers and school teachers, are concerned in this question.

If the farmers were the only ones concerned, I doubt if we would be justified in spending public money to send out instructors to the rural industries. We would say, "Take care of your own business. What do we care whether you have good fruit or not. It is your own fault if you lose." But the people of the cities and towns know very well that it is a matter of importance to them that there shall be a lot of cheese made in this Province of the very best quality that will bring the highest market price. If we can only get all the people to realize the great importance of agricultural prosperity to the whole community, it would be as easy to get the Dominion Government at Ottawa to devote ten millions of dollars for the improvement of agriculture, as to devote ten millions to build a bridge across the St. Lawrence River. They will do the one, but they have not done the other yet.

There is not a word to be said against legitimate expenditure to enable us to get our products to the market and to save in the cost of hauling, to construct railroads and canals and bridges and so on, but if these things are of importance to the country, is it not of equal importance that we spend, fairly and properly, money to develop the material that is to be carried over these highways?

Every once in a while someone gets up on the platform and advises the boy to stick to the farm, and in nine cases out of ten the man who gives the advice was born on the farm himself and did not stick there. He is a man born on a farm in the back townships. His father gave him an education and enabled him to get to town. He became a lawyer or a manufacturer and later on in life he comes out on the platform and advises the boy to stick to the farm. He means well, of course. He is in earnest in giving the advice. But what about the effect of the advice?

I cut out to-day a little bit of poetry from the New York Sun:

> "Stick to the farm," says the President to the wide-eyed farmer boy,
> Then he hies him back to his White House home with an air of rustic joy.
> "Stick to the farm," says the railroad king to the lad who looks afar,
> Then hikes him back on the double quick to his rustic private car.
> "Stick to the farm," says the clergyman to the youth on the worm fence perched
> Then lays his ear to the ground to hear a call to the city church.
> "Stick to the farm," says the doctor wise to those who would break the rut,
> Then hies him away where appendix grows in bountiful crops to cut.
> —(Applause.)

Now it will not do simply to advise the boy to stay on the farm. We might as well save ourselves the trouble. The boy sitting down in the audience sizes up the situation a great deal better than the man who is giving the advice, but if we can show that boy on the farm that there is money to be made there, you would not be required to give him advice. He would see it just as quickly as anybody else. If we can by some means, by education, make it possible for more money to be made on the farm so as to bring in better cash returns, the boy would not be looking at that article which he sees in the newspaper, "So-and-so got $100 for addressing a jury; and Doctor So-and-so got $2,000 for performing an operation; and So-and-so made $500 in some other easy way." If that boy was right up against the proposition of more money coming in, then you would have that matter solved and you will never solve it in any other way.

Agriculture will depend upon its being made profitable, and if we can keep the profits increasing upon the farms of this country, there will not be any great movement from the country to the city. If we leave the thing alone it will right itself. The farmer is bound to come out on top. He has the advantage, because he stays at the source of supply, and instead of paying 25c. a pound for turkeys, you will pay 35c.; and instead of paying nine or ten cents a quart for milk, you will pay fifteen cents; and instead of paying the prices you are now paying for bread and butter and cheese, you will pay fifty per cent. in advance. Why? Because the mass of the people have been crowding to the cities and towns and leaving the few people on the farms to produce the food. It will soon become almost impossible for the ordinary man to live in the town or city and live respectably and comfortably.

It should not be left to work itself out in that way. It is of importance to the people of the cities and towns that the agriculture of this country shall be developed. It is more important to them than to the farmer. That is putting the boot on the other leg, is it not?

The time is coming when the farmer will get more of the luxuries that the people of the towns and cities have. Improvements are being made in the farmer's home and there will be more agricultural papers coming to his house every week. He will have flowers outside his house, and shrubs trimmed up along the fence. He will have his mail left at his door post as do the people of the cities. He will have the telephone in his house. Life will be worth living.

Let the man in the town or city suddenly increase his supply of cash, what does he do? Fixes up his house and makes his surroundings a little more attractive. The farmer will do the same thing, and if the farmer does not do it, his wife will see that it is done. And when all these things happen, the boy and the girl will have no inclination to go off to the town.

Rural development along proper lines means a great deal for the Province of Ontario. It means also a great deal for the morals of the Province of Ontario. The success of our towns and cities depends to a large extent upon their being recruited by the strong, vigorous, honest, straightforward young men and women who come from the country. We must send in this supply or the towns and cities will certainly go down. The building up in the country of a strong, moral, rural community is a matter of great importance for the future of our towns and cities.

What do we lack most of all in this country? Someone might write down as a New Year's wish, "I wish all the people of the Province of Ontario were strictly honest." Would not that work revolutions in society and in business, if the whole community were morally honest, had everyday honesty? What is it we so much regret in this man or the other man that he does not just come up to that line of strictly moral honesty that we would like to see?

While I was in Christiana, in Norway, this summer, I was taken out to see a hotel out on the mountains, built in Norwegian style. There was one wing fitted up with furnishings from a Norwegian nobleman's house; another fitted up with furnishings from a Norwegian farmer's house. My friend said, "Excuse me, and I will get the key." He came back with the key, and we unlocked the door and walked in. He turned on the light and we walked through room after room. About the walls were most costly ornaments. We turned out the light and walked out again. He went off and handed the key to the maid, and I said, "That is most extraordinary. And he said, "What? " And I said, "That the maid gave you that key. I suppose you know her." He said, "I have not been here for a year." I said, "They would not do that for a stranger in Canada." You walk into a great hotel and ask the man or the proprietor for the key of a storeroom filled with expensive bric-a-brac and then take a party through, and hand it back and ask no question. Some people that we know would have some of the bric-a-brac in their pockets. He said, "We are honest in this country, we trust people." And so they do. I had instance after instance of that common virtue. If we could only get that instilled into the rural and urban communities of this country, we would be doing a mighty thing for the people of this Province.

These things may not appear to you as attractive as building castles in the air or laying out of schemes that will make immense fortunes, but my view is—and the more I look into it the more I have that view—that what this country needs, and upon what its future to a large extent will depend, is the developing along rational lines our agricultural wealth so that our annual production may be increased from two hundred millions to three or four; so that there will be a more even and equitable distribution of wealth; so that our farmers can be better themselves and have better furnished homes and that the farmers' wives may have a less laborious life, that all may be just as comfortable as their brothers and sisters in the towns and cities. What heaven-born right is there that men and women living in the towns and cities should have certain privileges that cannot be had in the rural parts?

The tendency in this Province is that the streams from the rural parts are all leading up to the bigger towns and cities and some men are becoming immensely wealthy just by the rapid increase of value per foot of property in Toronto in the vicinity of the corner of King and Yonge Streets. That is simply the outcome of the wealth of the rural parts flowing into that city. If we can do anything to make it so that the farmers shall have as comfortable homes and the farmers' wives live as well as the women in the towns and cities, if we can help to build up strong, contented, happy, moral communities in the agricultural parts, we shall be doing our duty to those who are living in the country, and we shall be helping in a movement that will benefit all classes, both urban and rural. It is a national question, it should not be considered from the standpoint of dairying or farming. It is something worthy of wider consideration and wider treatment than I think it has yet received at the hands of the people of Canada. (Applause).

Mr. Richardson, Assistant Commissioner of Agriculture for the State of New York, was then introduced. He said: I feel that I should not break the spell that has been placed upon you by the magnificent address given by your Deputy Minister of Agriculture, and I will not at this time and at this hour take your time for anything like a lengthy address. And I wish to assure you that I shall not do so. I am here by the request of Commissioner Pierce, Commissioner of Agriculture for the State of New York, who has asked me to come and express our greetings and felicitations to the dairymen of Ontario, and to say to them that we feel they are engaged to-day in a work the same as we are engaged in, of building up our business and making our business better by perseverance and by attention to scientific methods and to make our business strong and our influence great. We had the great pleasure a few weeks ago at the annual meeting of our State Dairymen's Association of receiving your Dairy Commissioner, Mr. Ruddick. It was a very great pleasure for us to see him, and it is partly as a compliment to him that the Commissioner has asked myself, and my associate Mr. Kirkland, to come up and meet with you to-day. The addresses I have heard since my arrival convince me that your work is going along the same lines as ours, and it is encouraging and interesting to me to know that we are working together in building up our business. We of the great State of New York feel, to-day, like stretching our hands across the River St. Lawrence and Lake Ontario to you agriculturists, to you dairymen of Ontario, and telling you that we believe in the future of this business I was pleased with the words of your president in introducing Dr. Publow of the State of New York. I call him a Professor in the College of Agriculture in our State, and we propose to keep him in our State. If it is necessary we may modify one of the principles of American greatness and establish an export duty instead of an import duty upon Prof. Publow. Again, Mr. President, thanking you for the courtesy of the invitation to extend the felicities of the Department of which I am representing, and thanking your Dairy Commissioner for the invitation to me and my associate to meet with you to-day, I wish you good evening. (Applause.)

FURTHER EXPERIMENTS ON THE CARE OF MILK FOR CHEESEMAKING.

By Geo. H. Barr, Ottawa.

The results of our experiments on the care of milk in 1908 pointed very clearly to the fact that cooling the milk without aeration immediately after being drawn from the cow, gave the finest curds and cheese.

In these experiments, the milk from two farms was made into cheese, members of the Dairy Division taking care of the evening's milk at each farm.

The work was continued during the past season under somewhat different conditions. Instead of using the milk from two herds and taking care of it ourselves, we made arrangements with the proprietor of the Rideau Queen factory to use all the milk suplied by his forty patrons on certain days during the season, and the patrons very kindly agreed to take care of their milk according to our instructions.

Our object this year was to secure further information regarding the care of milk by having the patrons do the work themselves, and if possible, ascertain the loss there was in making tainted and over-ripe milk into cheese.

To carry out these experiments, it was necessary to have two grades of milk delivered each day. We divided the patrons into two groups and by giving each group different instructions in regard to the care of their evening's milk, we were fairly successful in securing considerable difference in the condition of the milk delivered from each, and by using a weighing can with two compartments, we were able to divide and weigh the milk accurately into two vats without in any way mixing the good and the bad milk.

Our instructions in regard to the care of the milk were given by handing the patrons in each group, one of the following circulars:

Dear Sir:—

On...
of this week, will you please cool your evening's milk with either water or ice. DO NOT DIP OR AERATE IT IN ANY WAY. Cooling may be done in any of the following ways:

1. Place the milk cans in cold water, and as the cows are milked, strain the milk into the cans, and put the covers on as soon as milking is finished. It will probably require about as much water as there is milk.
2. Place a vessel containing cold water or ice in the milk and put the cover on the can. The outside of this vessel must be kept perfectly clear.
3. Place the milk pails in cold water and when the milk is cool put it in the milk can and put the cover on.

Dear Sir:—

On...
of this week, will you please aerate your evening's milk by DIPPING IT FOR 15 OR 20 MINUTES in the place you usually keep it. Don't cool it. Place the cover loosely on the can when through aerating.

Dear Sir:—

On...
of this week, will you please put your evening's milk directly into the milk can. Stir it occasionally, but DO NOT DIP IT UP IN THE AIR IN ANY WAY. Don't cool it. Place the cover loosely on the can when through stirring.

Dear Sir:—

On...
of this week, will you please cool your milk as you have been doing for us and also dip it well either before or during cooling.

We changed the patrons from one group to another occasionally, so that nearly every patron took care of his milk in all the different ways requested in the above letters.

A record was kept of the temperature of each patron's milk when delivered at the factory and when the night's and morning's milk was delivered in separate cans, the temperature of the night's milk was taken also.

Curd tests were made of each patron's milk every day and each vat of milk tested for butter fat.

The quantity of milk received each day was between 7,000 and 8,300 lbs.

The average temperature of the milk when delivered at the factory was as follows:

Method of Treating the Milk at the Farms.	Number of Samples.	Temp. of Evening's Milk.	Temp. of Mixed Milk.
Cooled without aeration..................	279	64.88	73.03
Dipped and cooled..................	30	65.50	74.95
Dipped without cooling....................	120	67.76	74.06
Stirred without cooling..................	103	71.86	75.98

There was slightly less than three degrees between the temperature of the evening's milk cooled without aeration and that dipped without cooling when delivered at the factory, and there is less difference in the temperature of the mixed milk, but the table giving the condition of the curd tests shows that the cooled milk was decidedly better in flavor, indicating very plainly that cooling the milk immediately after milking retards the development of injurious bacteria.

Method of Cooling the Milk at the Farms.	Number of Samples.	Temp. of Evening's Milk.	Temp. of Mixed Milk.
Cooled by setting milk cans in water.....	115	61.77	71.76
Cooled by setting milk pails in water.....	104	66.37	74.11
Cooled by using shotgun cans.......... .	71	67.22	76.24

We had splendid milk from all the above methods of cooling, but as shown in the table, the milk cooled by setting the milk cans in water gave the lowest temperatures and consequently, the sweetest milk.

EFFECT OF TEMPERATURE DURING THE NIGHT ON THE ACIDITY OF THE MILK.

Lowest Temp. During Night.	Treatment Given Evening's Milk.	Average Temp. Evening's Milk at Factory.	Average Temp. Mixed Milk at Factory.	When Starter was Added to Milk.	Per cent Starter Used.	Acidity of Milk in Vat when all in.
						%
59.60	Cooled	62.4	71.14	First milk in	⅜	.205
59.60	Not Cooled	63.5	71.25	First milk in	⅜	.215
63.64	Cooled	62.1	71.63	Milk half in	⅜	.200
63.64	Not Cooled	68.57	74.7	None and half in	⅜	.215
65.67	Cooled	66.55	75.	First and half in	⅜	.202
65.67	Not Cooled	71.30	77.9	None used	....	.220
67.	Aerated and Cooled	65.5	74.9	Milk half in	⅜	.205
67.	Cooled Only	67.1	74.8	Milk half in	⅜	.200
70.71	Cooled	67.	74.	At setting	⅜	.202
70.71	Not Cooled	73.5	77.7	None used	....	220

When the temperature of the air did not go below 65 during the night, the milk in the vat was overripe when not cooled (.22% acidity), but when cooled, it arrived in sweet condition when the temperature did not go below 71 degrees.

When the average temperature of the evening's milk was over 69 degrees, and the mixed milk over 75 degrees, the milk in the vats was overripe. I would recommend cooling the evening's milk to 65 degrees and if the morning's milk must be mixed with it, I would cool the evening's milk to 60 degrees. It is better to deliver the night's and morning's milk in separate cans if at all possible during warm weather.

EFFECT OF THE TEMPERATURE DURING THE NIGHT ON THE FLAVOR AND TEXTURE OF THE CURD TESTS AND THE CURDS IN THE VATS.

Lowest Temp. During Night.	Treatment given evening's milk.	Curd Tests Clean Flavor.	Curd Tests Solid Texture.	Curds Clean Flavor.	Curds Solid Texture.
		%	%	%	%
59.60	Cooled	83.8	94.1	100.0	100.0
59.60	Not Cooled	62.4	71.8	33.3	33.3
63.64	Cooled	86.8	92.1	50.0	100.0
63.64	Not Cooled	46.7	68.9	50.0	100.0
65.67	Cooled	76.3	79.0	100.0	100.0
65.67	Not Cooled	22.9	50.2	....	....
67	Aerated and Cooled	52.2	55.0	....	...
67	Cooled only	51.0	48.5	50.0	....
70.71	Cooled	79.5	85.0	100.0	100.0
70.71	Not Cooled	31.5	42.1	....	....

This table shows plainly that the temperature of the nights had very little effect on the condition of the curd tests and curds when the milk was cooled, but a decidedly bad effect when the milk was not cooled. None of the "cooled" milk was aerated. The "not cooled" milk was either dipped or stirred without cooling.

CONDITION OF THE CURD TESTS.

Method of Treating the Milk at the Farms.	No. of Curd Tests.	Clean Flavor.	Solid Texture.
		%	%
Cooled without Aeration....	279	77.41	76.00
Dipped and Cooled......................	30	50.00	50.00
Dipped without Cooling..................	120	50.83	62.50
Stirred without Cooling.................	103	54.37	64.07

This table shows a decided advantage in favor of cooling without aeration. There is also another advantage in cooling the milk. There was always a great amount of curdled cream on the strainer from the uncooled milk, especially when it was dipped. No such condition appeared on the strainer at any time from milk cooled without aeration and covered.

Method of Cooling the Milk at the Farms.	No. of Curd Tests.	Clean Flavor.	Solid Texture.
		%	%
Cooled by setting milk cans in water.....	116	81,03	80.17
Cooled by setting pails in water..........	98	75.51	76.53
Cooled by using shotgun cans............	58	75.86	70.69

There is a slight difference in favor of setting the milk cans in water. Cooling with shotgun cans produced a little more gas in the curd tests. The weak point in this method of cooling is the difficulty in keeping the outside of the cans perfectly clean.

Condition of the Curds in the Vats.

Method of Treating the Milk at the Farms.	Number of Curds.	Curds Clean in Flavor.	Curds with no Gas.
		%	%
Cooled without Aeration................	16	81.25	68.75
Cooled and Dipped........................	2	......	......
Dipped without Cooling..................	6	......	33.33
Stirred without Cooling..................	5	40.00	40.00

The question may be asked how 81.25% of the curds from milk cooled without aeration were clean in flavor, and only 68.75% free from gas. I think most cheese makers have seen curds with a few small pinholes that would be considered clean in flavor. We classed all curds gassy that showed any sign of pinholes.

I also wish to state that although the milk which was stirred without cooling gave better flavored curds and less gas than that aerated, it was in an overripe condition in hot weather when delivered at the factory and caused fast working curds, so that such treatment cannot be recommended in the warm summer weather. In the early spring and late fall when the weather is quite cool, stirring would be all right.

Difference in Yield between 4 Vats Normal Milk and 4 Vats Over-ripe Milk. Butter Fat and Casein Tests the Same.

	Lbs. Milk.	Lbs. Cheese.	Average Acidity at Setting.	Average Time Setting to Dipping.	Average Time Setting to Salting.	Lbs. Milk to 1 lb. Cheese.	Lbs. Cheese per 1 lb. Butter Fat.
			%	h. m.	h. m.		
Normal Milk.....	15969	1437½	.21	3 19	7 51	11.111	2.615
Overripe Milk.....	15715	1401	.24	1 32	7 14	11.217	2.592

Loss per 1000 lbs. milk. .83 lbs. cheese.
Total loss on 15,715 lbs. overripe milk 148.50 lbs. milk.
Total loss on 15,715 lbs. overripe milk 13.36 lbs. cheese.

In handling the fast working milk, we were able to control the conditions possibly better than in ordinary factory work, as we had plenty of help and could attend to all the details in connection with handling a fast curd. I think possibly we had less loss than there is in most factories from fast milk. The greatest loss we had from fast milk free from gas was 5 lbs. cheese in 3,869 lbs. milk.

DIFFERENCE IN YIELD BETWEEN 4 VATS NORMAL MILK AND 4 VATS GASSY MILK. BUTTER FAT AND CASEIN TESTS THE SAME.

	Lbs. Milk.	Lbs. Cheese.	Average Acidity at Setting.	Average Time Setting to Dipping.	Average Time Setting to Salting.	Lbs. Milk to 1 lb. Cheese.	Lbs. Cheese per 1 lb. Butter Fat.
			%	h. m.	h. m.		
Normal Milk	15311	1366.25	.212	2 58	7 20	11.206	2.638
Gassy Milk	14673	1294.25	.217	2 50	8 35	11.337	2.582

Loss per 1000 lbs. milk. 1.03 lbs. cheese.
Total loss on 14,673 lbs. gassy milk 169.54 lbs. milk.
Total loss on 14,673 lbs. gassy milk 15.13 lbs. cheese.

The loss in making up gassy milk varied a great deal. One day we had a loss of 10.88 lbs. cheese in a vat of 3,511 lbs. milk, while other days there would be very little loss with apparently as bad gassy conditions. The greatest loss we had from milk both gassy and overripe, was 8.9 lbs. cheese in a vat of 4,469 lbs. of milk. The average loss from gassy and overripe milk was greater than the average loss from either gassy or overripe milk alone.

LOSS OF FAT IN THE WHEY.

From milk cooled without aeration	.20	per cent.
" " cooled and dipped	.22	"
" " stirred without cooling	.22	"
" " dipped without cooling	.24	"
" " in sweet, clean, flavored condition	.194	"
" " in gassy condition	.216	"
" " in overripe condition	.250	"
" " in overripe and gassy condition	.273	"

FLAVOR OF THE CHEESE, 1909.

Method of Treating the Milk at the Farms.	Tested when about three. weeks old	Tested on October 16th.
	Flavor good and not quite clean.	Flavor good and not quite clean.
	%	%
Cooled without Aeration	93.7	50.0
Dipped and Cooled	50.0	00
Dipped without Cooling	50.0	17.0
Stirred without Cooling	100.0	50.0

Cheese made between June 11th and August 12th.

I may say that we had a few cheese that would be called fancy in flavor. I believe the cause was dirty whey tanks and returning the sour, bad flavored whey in the milk cans. The cheese remained in the factory curing room from six to fifteen days, the temperature frequently going as high as 85 degrees, which simply ruined some of the cheese.

The comparison in the above table shows that cooling the milk without aeration gave much better results than exposing the milk to the air. Stirring without cooling gave slightly the best flavored cheese when three weeks old, but we must not forget that this milk was usually overripe and the texture of the cheese was not good.

After two seasons' work, I am quite convinced that no method of cooling the milk will produce the finest flavored milk, or make fine flavored cheese, unless everything is kept scrupulously clean and the cows receive clean, wholesome feed and water.

When the whey is returned in the milk cans, it should be pasteurized and the tanks kept clean. It is simply impossible to have the finest flavored cheese when sour dirty whey is returned in the cans or when rusty milk cans or pails are used. If cheese factory patrons would exercise reasonable cleanliness in taking care of the utensils used for milk and in milking the cows, and then cool the evening's milk immediately after it is drawn from the cow to sixty or sixty-five degrees, with as little exposure to the atmosphere as possible and cover it up, we would have practically no bad flavored cheese to put on the market. Our cheesemakers would be saved much hard labor and worry and there would be thousands of dollars extra in the pockets of both factorymen and patrons.

Q. Would you recommend the ordinary cheese maker to take out a gassy curd in preference to leaving it to go a little higher?

A. I would, because I know I could handle it better myself in that way.

Q. What would you do in case a man had not any more help than he could really get along with, would you prefer cooking?

A. I would take them out because I do not think it is as much work to take them out as to get the water. If you can cut them fine and cut the curds out with a little less acid, you will need no more stirring than in normal curd, and I think the texture will be better. That has been my experience, but if a man is handling another way then I do not know that there is much choice. I prefer doing it the other way because I have always practised that. If I was not able to get that whey off before there was as much acid or a little more acid than the normal curd, then I would wash it by all means.

Q. Do I understand you to say you take the curds away firm?

A. I would take the whey off. I would cut the whey fine and take the curd off before there is much acid, no matter what the condition of the whey, soft or hard, I never find any trouble in stirring the curd and getting the moisture.

Q. Would you use rennet?

A. Yes.

Q. If you had a large vat?

A. Yes. If you can get it out in the same condition as you dip your curd as we do on the curd sinks, I think it is about the same thing. Some of these fast curds we had out in one hour and a half, simply because they did not have very much acid. If we cut fine we do not have to stir them any more than curds we had in three hours, simply because we did not have the acid. It drained out and got away.

Q. Your tests were as between normal milk and gassy milk?

A. Yes, there was a little gas in most of the milk.

Q. You did not make any tests between what we would call ideal milk?

A. It is pretty hard to get ideal milk at Smith Falls' factory, but we got just as bad milk there as I have ever seen. This is gassy milk, not over-ripe, and there were one or two floaters in this. They were in the whey practically the same time. We knew this milk was gassy, but it did not stay any longer in the whey. You can get them out of the whey just as quick when they are gassy as when they are not, by ripening the milk and handling the curd. You see the difference in the time. These were an hour and fifteen minutes longer in getting the salt in, and that is where the loss comes.

Q. How do you account for the loss?

A. That is something I could not account for. Some days we lost 10 pounds.

Q. The worse the milk stinks the less you can get out of it?

A. Yes, sometimes you will have a good deal more loss than other times. The average loss in over-ripe milk was quite as bad or more than the loss in gassy milk. When you get the two together then you get the worst conditions.

Q. If you had a cheese white in texture, what would you do?

A. The trouble is to know how much to get in, without getting it past a poor Manchester cheese. I do not think it is safe to try to make cheese that is dead pale, because it is risky, and you are sure to have a loss in handling that kind of milk, and you will have just as much loss if you let the milk get over-ripe in the vat. I know many cheese-makers simply let the milk get over-ripe before they commence work. It is just as bad to over-ripen the milk in the vat as it is to have it over-ripe when it comes in.

Q. At what temperature do you recommend delivering the milk?

A. In ordinary factory work, I recommend 60 to 65 degrees.

Q. You think the cheesemaker ought to pay for this kind of milk?

A. No, I do not. Often you will take in milk that is bad and you can not detect it in the cans by the whey stand. We took in milk last year that I would not send on any consideration in our factory work, and when it was made into curds we would get poor conditions.

Q. A cheesemaker ought to be able to see a rusty can?

A. After two years' work, I am convinced that there is no method of cooling the milk and taking care of it on the farm that will produce fine milk unless everything is kept scrupulously clean and the cow receives good wholesome food and water. I think it is impossible to have the finest cheese when the tank at the factory is dirty and sour, and the whey stinks when it goes home in the cans. On the other hand, I am just as convinced that if our cheese factory patrons will cool the evening's milk down to 60 or 65 degrees as soon as it is taken from the cow, and cover it up, he will have practically no bad flavored cheese to put on the market. Our cheesemakers will be saved an endless amount of time and money, and it will be thousands of dollars in the pockets of factorymen and the patrons.

Q. Are you thoroughly satisfied we can make more cheese from it?

A. I thought I was going to get out of that. There is just one thing about this butter-fat business that is rather a surprise to me. I do not know that you are always sure of making any amount of cheese from any amount of butter-fat all the time. One of the strange things about our work during the past two years is that we are not able to make as much cheese from 3.5 per cent. fat in milk in August as we were from 3.2 and 3.3 per cent. fat in milk in June. If anybody would give me a solution, I would like to have it.

Q. At the same time, did you make more cheese from 3.5 per cent. fat in milk in August as you did from 3.2 per cent. fat?

A. We did not have any 3.2 milk in August.

Q. You are just speaking from vats and not from individual herds?

A. Yes, just from vats. It took more milk to make a pound of cheese in August when the milk was testing 3.5 per cent. fat than it did to make a pound of cheese in June when the milk was testing 3.3 per cent fat.

Q. Was that under favorable conditions?

A. When the milk was just as good in one case as the other as far as I could see.

Q. What was the condition of the feed; any drought?

A. This year the conditions were pretty favorable.

Dr. Publow: My record in New York shows the same thing, but I have been able to trace the difference to dry feed, and the most remarkable results have occurred at the time when the country was dry and there was a lack of rain. I think I have about twelve hundred samples that proved up in that same way, and as far as I have been able to learn it has all been due to that fact. I had casein tests and fat tests, and in August I found the abnormal relationship between the fat and the casein quite sufficient to demonstrate to me that that was the cause of the difference in our yield of cheese; and at the same time we were troubled more or less with a little greasiness in our curds.

Q. Did you find the curds were hard to thicken?

A. Yes.

Q. Do we not nearly always have better conditions in June than in August?

A. Naturally, conditions are usually better in June than in August. We cannot get over that, and it has always been rather a surprise to me, because I have said before I did this work that if the patrons would send us as good milk in July and in August as they do in May and June, we would make just as many pounds of cheese from as many pounds of milk. Now, I would not say that to-day, because we cannot do it. We are getting as good milk in August as we were in June, and we could not make as much cheese; therefore, I have got to take back what I used to say.

Mr. Ruddick: I would like to say one word in regard to the yield of cheese from milk at different times of the year. I do not think we can put such stress on that point in connection with paying by test at the factory, because when you pay by fat test you are paying under exactly the same condition and not comparing one month with another, so that it does not have very much bearing on the question of paying for milk by the test.

A Member: Did you find any difference between 3.4 milk and 3.5 milk in August?

Mr. Barr: I cannot say off-hand, but I will try and answer that question another time. There is no doubt you would make more from 3.5 per cent. fat milk than from 3.2 per cent. in August, but the question in my mind was, why we make less cheese from 3.5 per cent. fat in milk in August than we did from 3.3 per cent. in June?

REPORT OF CHIEF DAIRY INSTRUCTOR AND SANITARY INSPECTOR.

By G. G. Publow, Kingston.

I take pleasure in presenting my seventh annual report as Chief Dairy Instructor and Sanitary Inspector for Eastern Ontario.

There was practically no change in the manner in which the work of instruction and inspection was carried on this season, and so the general outline of my report cannot be changed very much.

The same number of instructors were engaged, but owing to my appointment as Superintendent of the Kingston Dairy School and taking charge of the creamery work this season, my duties were so increased that it was found necessary that I should have an assistant in the work, and Mr. J. F. Singleton was selected for this position. He was given charge of a number of the creameries, and also assisted me in the general work of syndicate inspection. I may say that his work was very satisfactory, and I found it a great advantage to be relieved of much of the detail work that previously required so much of my time.

The instructors under my charge were the same as last season with the exception of Mr. McKinley, in Ottawa East district, who replaced Mr. Villeneuve, who resigned early in the season to accept a similar position in Manitoba.

As has been the custom in the past few years, the instructors took a special course of instruction at the Eastern Dairy School, where lectures were given in bacteriology, dairy chemistry, and factory sanitation, as well as in cheese and butter-making, and considerable time was devoted to a discussion of matters pertaining to the season's work.

Rather than weary you with a detailed statement of each instructor's work, I have prepared a tabulated form showing in a concise manner what has been accomplished, together with other interesting information pertaining to each district.

From this summary it will be seen that there were 24 instructors and sanitary inspectors who had 950 cheese factories under their supervision.

Full-day visits to the number of 1,641 were given to these factories and 5,170 call visits, making a total of 6,811. We find this visiting the factories at short intervals a great factor in keeping the cheese of uniform quality throughout the season. They also enable a more frequent sanitary inspection, and this results in the factories and surroundings being kept in a much better condition than they otherwise might be if inspection were not so frequent.

I am pleased to be able to report a very marked improvement in the sanitary condition of the cheese factories this season, as of the 950 regularly inspected 844 were reported as kept in a satisfactory condition.

The instructors did not confine their attention to the conditions at the factory however, but devoted considerable time to visiting the farms of patrons who were delivering milk to the factory in an unsatisfactory condition.

The farms of 3,356 patrons were visited and inspected, which is an increase of 675 more than last year. This I consider to be a very important feature of our work, as the quality of the cheese is largely determined by the condition in which the milk is delivered to the factory. It is gratifying to be able to report that there was a marked improvement generally, in the condition in which the milk was delivered this year, but notwithstanding, tons of milk were rejected at the factories owing to lack of proper cooling and the unsanitary conditions under which it was produced.

With very few exceptions, the patrons received the assistance and advice of the instructors in a friendly and appreciative manner and in practically every case the milk was delivered in better condition after the instructor's visit to the farm.

Another means we employ for the instruction of the patrons along these lines, is the sending to the annual meetings of factories, competent speakers, generally the instructors of the local syndicates, who as a rule, are best acquainted with the local conditions in their own respective districts, and can tell their patrons what their particular difficulties are, and how best to remedy them.

As an evidence that this work is being appreciated, we have had to supply speakers to over 100 of these meetings already held since the factory season closed, and the speakers report a much greater enthusiasm in the subjects discussed than ever before. Right here I would like to commend Mr. Ruddick, Dairy Commissioner, and his staff, for the excellent work they are doing in this respect.

The number of patrons delivering milk to the cheese factories was 35,019, which is 1,782 less than last year, and the number of cows from which milk for cheese-making was obtained was 334,831, about 6,000 less than last season. But notwithstanding this falling off in the number of patrons and cows, the amount of milk delivered to the cheese factories from May 1st to November 1st was 485,195 tons, 709 lbs., which is an increase of 25,341 tons over the amount supplied last year. The average yield per cow for the six months was 2,863 lbs., an increased yield of 163 lbs. over that of last year, and the average per cent. of fat in the milk for the six months was 3.66, which is practically the same as last season.

The total output of cheese from May 1st to November 1st, was 90,170,874 lbs., the average amount of milk required to make a lb. of cheese being 10.76 lbs.

This is an increase of 4,360,965 lbs. for the six months from 6,000 cows less than last year, which at the average selling price of cheese for the season amounts to $697,754.35.

The testing of milk for adulteration was also conducted by the instructors, 41,412 samples were tested by lactometer and Babcock tests, and of this number 141 gave indications of having been tampered with. After a thorough investigation had been made, 107 cases were handed over to the official prosecutors engaged by the Eastern Ontario Dairymen's Association to be dealt with.

Convictions were obtained in all cases and fines were imposed on the convicted parties of from $5 to $50 and costs, amounting in all to $2,405.00. Of this amount $1,207.34 was paid over to the treasurer of the E.O.D.A. and $1,197.66 to the treasurers of factories in which the offences were committed.

The number of factories paying for the milk according to test is only 86, or 1 less than last season.

It is very gratifying to note the continued improvement in the factory buildings and surroundings, as of the 950 factories under my supervision, 844 were kept in a good sanitary condition throughout the season, and the foul smelling, dilapidated buildings, which used to be so common, will evidently soon be things of the past, as factorymen are making the required improvements about as quickly as the profits from their business will warrant.

Twenty-seven new factories were built this season and 493 made improvements in buildings or plant. The estimated expenditure including new buildings amounted to $136,542.00, which is $5,847.00 more than the amount expended last year in this way.

While speaking of the factories, I would say that their weakest point, as a rule, is the lack of good facilities for controlling the temperature of the curing rooms throughout the different months of the year, and it is to be hoped that the patrons will soon come to realize the benefits to be derived from having a uniform low temperature for the curing of their cheese, and that they will co-operate with the manufacturers in providing the proper facilities.

Regarding the manufacture of butter from the whey, I might say that it is on the increase as the number of factories engaged in it this year was 119 as compared with 63 last year. The yield of butter showed a wide variation of from 3½ to 7½ lbs. per ton of whey, the increased yield being obtained when the milk was delivered in an over-ripe and gassy condition. The great bulk of this butter is used by the factory patrons, the price paid being about the same as for creamery butter, the majority of patrons expressing themselves as being fairly well satisfied with the quality.

The number of creameries in operation in Eastern Ontario this season was 28, which is 1 less than last. They are, with two exceptions, all operated on the cream-gathering plan.

Mr. Singleton acted as instructor and inspector for 16 of these creameries, the others being looked after by the cheese instructors in whose groups they happened to be located, this being thought to be the most satisfactory and economical way of reaching them, owing to the fact that they are so widely scattered throughout the different districts.

There does not appear to be the same enthusiasm in dairy matters among the creamery patrons that we find in the cheese-making districts, and this is not to be wondered at from the small yield of butter per cow that is evidently being obtained.

While we have not been able to get full statistics for this report, as we have received complete returns from only two-thirds of the creameries, our estimate is based on the reports of those received, which can be considered as being a fair average.

It would appear that the number of cows producing milk from which cream was supplied to the creameries was about 10,200, and the yield of butter per cow for a period of six months from May 1st to November 1st was not more than 90 lbs., or less than 4 lbs. per week, which is indeed a very low yield.

Practically none of this butter was exported, as it was all required for local use. The average selling price for the season was about 23½ cts. per lb., and the quality of the butter on the whole was reported as being very satisfactory. However, as Mr. Singleton is to speak specially on the creamery work, I shall not go any more fully into this subject.

I am glad to be able to report an increase in the number of factories that practise the pasteurizing of the whey, there being 63 doing so, as compared with 26 last season. When the whey is to be returned to the farms in the cans in which the milk has been delivered to the factory, pasteurizing, when properly done has much to commend it. There are many benefits to be derived from it. The whey is returned in a much sweeter condition, there is a more even distribution of the fat, the cans are much more easily cleaned, and it prevents whey tanks at the factory becoming the seeding centre for many undesirable fermentations. It has also been proven to be one of the best methods we have tried for keeping the whey tanks in a more sanitary condition.

During the season we had Dr. Connell, our bacteriologist, carry on an investigation for the purpose of determining the efficiency of the methods used, and as he is to report specially on the result of his investigations, I will leave this important matter for him to deal with.

In reporting on the quality of the cheese, it is very gratifying indeed to be able to say that the average quality has been of an exceptionally high standard, and although the makers met with good deal of difficulty, fewer rejections were reported than in any previous year. The most common defects in the cheese complained of were openness of make and flavor not clean. Very few complaints were made regarding acidy cheese, and the improvement in this respect has been very marked. Some complaints were made regarding the finish and the inequality in the size of the cheese. While the average maker has made a marked improvement in this respect, we have still too many who do not exercise sufficient care regarding the appearance and uniformity in the size of their cheese, and this defect is not excusable as it is entirely under the control of the maker.

Name of Instructor.	Syndicate.	No of factories in syndicate.	No of full-day visits given.	No. of call visits given.	No. of patrons.	No. of patrons visited.	No. of cows from which milk for cheese making was obtained.	Average yield of milk per cow from May 1st to Nov. 1st.
A. McDonnell	Alexandria	36	70	180	1,063	15	10,352	2,684
W. J. Ragsdale	Almonte	40	81	166	1,576	144	14,554	2,578
H. Howie	Belleville	39	74	143	1,879	316	17,058	3,132
A. H. Wilson	Brockville E.	47	94	139	1,762	42	17,510	2,808
P. Nolan	Brockville N.	45	62	201	1,009	25	14,091	3,301
S. S Cheetham	Brockville W.	42	92	169	1,044	164	14,275	3,206
R. T. Gray	Campbellford	40	85	228	1,608	105	15,361	3,249
T. J. Ellis	Chesterville	38	37	290	968	15	14,988	3,069
J. Buro	Cornwall	37	52	311	1,131	30	12,960	2,659
C. B. Larry	Finch	39	51	186	1,200	91	11,724	2,869
W. G. Gardiner	Kemptville	43	98	239	1,664	123	15,410	2,759
H. Brintnell	Kingston	40	107	170	1,112	76	14,019	2,931
D. J. Cameron	Lindsay	30	46	187	1,657	150	11,530	2,545
J. B. Lowery	Madoc	34	87	142	970	376	9,975	2,469
C. W. Norval	Morrisburg	42	71	252	1,284	40	14,124	2,927
Geo. Bensley	Napanee	42	76	204	2,927	60	25,305	2,819
W. W. Dool	Ottawa	37	64	276	954	29	10,272	2,512
A. McKinley	Ottawa E.	41	84	195	1,186	183	11,459	2,789
R. E. Elliott	Ottawa W.	36	42	164	1,467	209	10,905	2,357
J. H. Echlin	Perth	38	29	200	1,520	93	10,640	3,029
R. W. Ward	Peterboro	36	76	352	1,634	489	12,893	2,952
T. E. Whattam	Picton	36	59	304	2,938	426	21,695	3,210
J. Charbonneau	Plantagenet	46	47	241	1,249	52	10,450	3,256
W. G. Graham	Vankleek Hill	46	57	230	1,217	53	13,281	2,602
		950	1,641	5,170	35,019	3,356	334,831	2,863

I am pleased to report that the efforts we have been putting forth to put the dairy business on a more substantial and prosperous basis in Eastern Ontario, are beginning to show very encouraging results. Among the factorymen we find a greater enthusiasm and confidence in the work than ever before. The new factories they have erected have an appearance of permanency about them, and the improvements made in various ways go to show that they feel confident that the future of the industry warrants the expenditure they have made.

Among the patrons we find equally encouraging results. Driving through the country, one cannot fail to notice the great improvement in the farm buildings, and the provisions that have been made for a better housing and feeding of the stock; and it would appear that these improvements are being made with a view to specializing in the production of dairy products, and as an evidence of this, I may say that during the past summer alone 1,070 silos were erected, and I doubt if there were ever so many new stands, with facilities for cooling the milk, erected in one season. Greater attention is being given also to the selection and care of the dairy herds and everything points to an increase of interest and further improvements on the part of those who furnish the raw material.

Average per cent of fat in milk from May 1st to Nov. 1st.	No. of lbs. of cheese made from May 1st to Nov. 1st.	No. of curd tests made.	No. of tests for adulteration.	No. of samples adulterated.	No. of factories which pasteurized the whey.	No. of factories manufacturing whey butter.	No. of factories which pay by test.	No. of curing rooms in which temperature can be controlled.	No. of new factories built.	No. of factories which made improvements in buildings or plant.	Estimated expenditure for improvements including new buildings.
3.70	2,615,173	102	930	6	0	0	2	0	1	15	$ 3,150
3.68	3,465,763	316	2,056	3	2	1	1	1	0	36	4,500
3.72	4,692,022	53	1,759	8	1	0	0	6	1	4	5,500
3.49	4,445,079	133	1,604	2	14	13	4	1	1	33	9,995
3.70	4,269,721	75	1,301	1	0	10	0	2	4	31	12,535
3.59	4,186,814	310	1,602	10	6	10	4	3	0	26	10,921
3.63	4,560,242	124	2,495	5	2	1	0	1	2	23	6,025
3.62	3,993,580	25	1,022	2	2	9	11	0	1	12	3,500
3.76	3,260,663	322	865	10	7	1	15	0	3	26	7,159
3.60	3,192,427	60	1,500	6	1	2	0	2	2	13	4,864
3.59	3,917,143	71	1,510	3	2	5	10	0	1	22	6,510
3.80	3,815,141	164	2,532	13	4	6	0	0	2	2	3,400
3.54	2,702,777	62	1,950	2	3	1	1	0	0	21	1,200
3.77	2,496,075	74	2,893	2	0	0	0	2	0	23	1,888
3.67	4,101,343	56	1,775	3	1	18	2	0	0	31	5,120
3.58	7,117,374	40	2,186	3	1	5	0	4	1	15	5,700
3.56	2,425,070	47	1,178	0	2	6	8	1	1	12	3,225
3.80	3,118,919	181	1,666	4	1	5	10	0	2	10	5,775
3.52	2,421,588	107	850	6	2	3	1	5	1	35	6,847
3.72	2,984,080	69	1,884	2	1	5	0	0	1	7	2,735
3.58	3,384,844	53	1,513	4	0	7	14	3	1	28	6,351
3.73	6,466,566	144	2,980	13	2	11	0	14	0	30	8,200
3.84	3,256,917	200	1,740	12	3	0	2	2	1	19	6,742
3.70	3,281,553	34	1,531	21	6	0	1	1	1	19	4,700
3.66	90,170,874	2,822	41,412	141	63	119	86	48	27	493	136,542

I believe we have just finished the most successful year in the history of our instruction work, and in concluding my report on the same, I want to express my appreciation of the conduct and work of the instructors. They at all times showed a willingness to carry out my wishes, and they have put forth an honest effort to bring about improvements in their respective districts.

Q.—Give us the cost of the pasteurization of whey under ordinary conditions.

A.—About 75 cents per ton of cheese. We made some experiments at Kingston at the school last winter, and it ran all the way from 50 cents to $1. To pasteurize economically you should have a large boiler.

Q.—How close should it be to the tank?

A.—About thirty feet. I call that close. The cheapest way this year was where the factory had an engine, and used the engine for pumping or stirring the curds. You put the condensed steam from that engine into the lower tank, and the whey was then lifted with an ejector. If the condensed steam does not raise up the steam to 125 degrees, they put in live steam, and then eject it.

Q.—Where the whey is not returned in the morning, do you think it would be advisable for feeding purposes to pasteurize the whey?

A.—Yes.

Q.—Do you pasteurize in the lower tank or the upper tank?

A.—Where you have an engine and an ejector, it is better to do it in the lower tank, heat to 120 degrees and then eject.

Q.—Would you finish in the lower tank outside?

A.—Yes, or if you eject from that again. I think that is one thing that more attention should be given to, and I really believe when the farmers of this country come to realize the benefit of pasteurizing that the manufacture of whey butter will stop.

Q.—Should this whey be kept warm after pasteurizing?

A.—No. Once pasteurized is sufficient, but you must take this precaution, that nothing gets into it. Some men pasteurize it, and then run in the washings of the floor. That is not right.

Q.—Would the tank require to be cleaned out daily?

A.—Yes; it is better to be cleaned out and the whey all run off or taken away. You will have a higher percentage of acid in the whey if you do not do that.

Mr. McGrath: Mr Publow mentioned having well qualified speakers at the annual meeting of cheese factories. It seems hard to get the producers of the milk to understand how they are interested in the factory. A great many are under the impression that when they take the milk to the factory that is about as far as they are concerned. A great many patrons have said they were surprised that they were so much interested as Mr. Publow explained to them. He explained where their losses were. I think the Association or the Department should not stop with what they have done with regard to getting speakers at meetings. I think it is the best way to reach the producers of milk.

The Chairman: That is all right, but I think the Department is doing everything in its power. They are sending out circulars to every factory, as far as I know, saying they will get a speaker if they want one. But I am sorry to hear that only a small percentage of those factories have replied to the circulars. The suggestion that Mr. McGrath has just made, that more interest would be taken by the patrons of cheese factories if they had a speaker at their meetings is correct. So far as my experience goes, it is the best place to reach the patrons.

A Member: I would suggest that the speakers at these annual meetings be given the same chart as Mr. Barr has used here. These charts have a splendid effect. They are more convincing than even the word of the speaker. We ought to try and have some of these charts present, and I think if all the speakers could be furnished with a chart it would have a better effect. It would also be a good thing if the factory owners would have an oyster supper, or some other like festive feature. I have attended some meetings where every patron was present.

Q.—Do you pasteurize the whey immediately after drawing from the vat?

Mr. Publow: Yes.

ADDRESSES OF WELCOME.

MR. L. W. MARSH, Mayor: It has been my pleasure during the last twelve months to welcome to this city several conventions, and it is one of the greatest pleasures I have ever had to welcome to the City of Belleville a body such as the Eastern Ontario Dairymen's Association. I say that advisedly, because I have some personal connection with the Association in the way of manufacturing, and because this Association is doing so much towards the developing the common interest of our country, and the country is only built up as its commercial interests are built up It seems to me that Belleville is the natural point at which conventions of this kind should be held, on account of its being the centre of one of the largest dairying districts in the province. We are very glad to see you here and want to congratulate your body on the excellent programme that you have before you. I do not think that I ever saw a better one arranged. It is my pleasure on behalf of the citizens of Belleville to welcome you officially to this city. We hope that your deliberations will be profitable and pleasant and that you will have a good time, in fact that you will have such a good time that you will make up your minds to come back to Belleville in a very short time. If you get too exuberant, come and see the Mayor, and he will see that everything is all right. (Laughter and applause.)

THE CHAIRMAN: I have now much pleasure in introducing my colleague, Mr. Johnston, the local member of the Ontario Legislature, who is no stranger to a Belleville audience. I take this opportunity of expressing my gratitude to Mr. Johnston for the help that he has always given me in the Legislature in connection with any project that I had to advance in the interest of the dairymen. Mr. Johnston is not a dairyman or a farmer, in the sense that we usually speak of them, But I have to say that I am disappointed sometimes that more of our farmers, members in the House, have not given me the same amount of assistance that I thought I was entitled to, and not nearly as much as I received from Mr. Johnston and a few others of his kind. I think it is only right that I should make public acknowledgement of it, and to say that we owe to Mr. Johnston a debt of gratitude for the assistance that he has given to our Association, and to the cause we have at heart.

JOHN W. JOHNSTON, M.P.P.: I believe that this is the thirty-third anniversary of the existence of the Eastern Ontario Dairymen's Association. That is a fairly good age in this country of ours. Your Association has proved its right to exist, and it is fully and finally accepted. I noticed last night, that notwithstanding all these years of education and association together you still need to be preached to. The same thing is true of the church. Some of us are moral, but it requires a sermon or two every Sunday to keep us right. And I suppose it is the same with the dairymen. You require to have these leading men who have the technical knowledge, to give you instructions from time to time in order that you may not fall below the standard. I had the pleasure some twelve years ago, when I held the position of Mayor, to welcome this Association, and I have followed its career and the great industry it represents ever since. I congratulate you upon the position that it is holding in the community. It is not what you think of it, but what the great community thinks of the industry that you represent. There are certain reasons why we, in the city of Belleville should welcome you, owing to the importance of this industry. We can recollect the time when our friends to the south, through the McKinley tariff, seemed to have killed the agricultural industry of the Province of Ontario, but what seemed to be a great disaster is turning out to be a blessing in disguise. I honor you men for the position you took, and the work you have done in meeting the difficulties that then arose. You have carved out for yourselves, by the excellence of your products, a way to the British market, and have captured that market and made it your own. That is one reason why I welcome you here. I am not only welcoming you as a citizen of Belleville, but I am welcoming you as a representative of one of the ridings of the great County of Hastings, and I think that I may safely include the County of Prince Edward and all the Bay of Quinte shore. We welcome you because of the lessons we have learned from your methods and system and order, and co-operation that has made your business a success.

What is education? It is simply a repetition. When a man begins to etch a steel or copper plate for the purpose of making a beautiful picture the first impression or two does not amount to very much. But a beginning has to be made, and as the skilful artist goes on day after day and week after week, and he finally has it completed and at any time he can produce from that plate a magnificent book. So it is with following up the best there is in any industry in this great country of ours. Patient toil alone will bring the results that are desired. I welcome you on that account and I welcome you for the other reason that we all derive a profit from your industry. There is not a man in this community, or in any urban community throughout the whole Province of Ontario, who does not derive some practical benefit from the great industry with which you are connected. I welcome you because of the personal interest we have in the industry that you are carrying on, and also I welcome you because we will have a good time together. "As iron sharpeneth iron, so does the countenance of a man his friend." "It's always fair weather, life slips its tether, when good fellows get together"—good fellows such as compose the Eastern Dairymen's Association.

Milk is indispensable, as we heard last night from the Deputy Minister of Agriculture, whose work I have watched with great interest, and who is a credit to the Province of Ontario. (Applause.) I have never heard a man who had the facility of expression and the knowledge back of the expression, that conveyed the fact that he knew what he was talking about more than has Mr. James, the Deputy Minister of Agriculture, and he is always ready to come when he is called to any meeting to further the interest of the great cause of agriculture. Milk is indispensable. There are some things that will never go out of fashion. You will never reach the limit of this industry. Bread and milk will never go out of fashion, and bread and cheese will never go out of fashion, not only in Canada, but thoughout the whole civilized world. That industry is in demand.

There is no man in the house of Assembly in the Province of Ontario who is more thoroughly esteemed and whose judgment is more confided in than the member for Leeds, Mr. J. R. Dargavel. (Applause.) If you wish to show your good judgment and your good sense, I would not want to see anything more than the fact that J. R. Dargavel is filling this chair this afternoon. If you get a man of that type at the head of this organization there is no danger that it will ever fall below the standard to which you have raised it.

I am going to take the opportunity this afternoon of saying a few words to this intelligent audience about New Ontario. It was touched upon last night by Mr. James.

I had the privilege in the month of September last of visiting what we know as New Ontario. If I had been speaking to an audience prior to the month of September, I very likely would have said, "If our farmers cannot get a farm in this Province the only thing to do is to go to the North-west." I would not say that to-day. I have changed my perspective entirely. I say the opportunities that exist in the new portion of our Province are infinitely superior, in my estimation, infinitely superior to anything that can be offered to our Canadian farmers in the North-west Provinces, and I have reached that after very careful consideration. No man need pass by this great Province of Ontario in order to find an opportunity of tilling the virgin soil.

When we went a hundred miles north of here we used to think we were at the limit of civilization, and that there was nothing left after we got to the northern part of the County of Hastings, Peterborough, Lennox and Addington.

I travelled 500 miles north of the city of Toronto, and when we reached Cochrane, the junction of the Grand Trunk Pacific with the Temiskaming and Northern Ontario Railway, we were then only 170 miles from the Hudson Bay, and it will not be much of a task to continue the Government owned railway to Hudson Bay and give an opportunity for the produce of that great country to reach tide water in another way than by the St. Lawrence.

This province of Ontario is four times larger than England, six times larger than Ireland, and seven times larger than Scotland. It is the greatest heritage that any people in this world possess. Up in the northern country there are sixteen million acres of land which is known as the great clay belt. And that clay belt is alluvial soil. It is covered with the woods of commerce, and is indented with lakes and rivers, bays and valleys, full of wood ready to be made into timber.

We saw the fair at Englehart, which is one of the stations on the T. & N. O., and let me add this, that there never was a wiser project of any administration in this Province than that which was put into operation by the Hon. G. W. Ross's Government when he built a railway from North Bay up into New Ontario; and there never was a wiser scheme than that which put the administration of it into the hands of an independent Commission into which no politics can enter. This railway is being run to serve first of all the people of that new part of the Province, and incidentally to bring money to the treasury of the Province of Ontario; and there is not a better built railway, not only in the Dominion of Canada, but I venture to say on the whole American continent, than that railway that is owned by the people of Ontario.

Now, what I saw at this fair at Englehart, spring and fall wheat and rye and barley, for instance, was just as good as you ever raised on the best 100 acres of land in this section of the older part of the Province of Ontario. On that soil you can raise anything that can be raised in the southern part of the Province of Ontario, and the climate is just as fine as this portion of the old Province. We read the other day that the thermometer had dropped to 52 degrees below zero in Saskatchewan. Such a thing never occurred in the Province of Ontario in all its history since civilized man came here. And while they may possibly have a trifle colder weather up north, yet after the land has been settled and drained they will have just as genial a climate as ours at the Bay of Quinte. The markets are already there. If a man takes 160 acres of land there is standing upon that land spruce wood, the most valuable timber we now have, and even finer than white pine used to be. Mills are being started to make paper almost entirely from spruce, and the spruce comes from the Province of Quebec and the northern portion of the Province of Ontario. When a man clears 160 acres, he can calculate that he will get enough for his spruce to pay for the entire clearing of the land, and the stumping can be done with one team. We want to see the stream of immigration diverted from the North-west Territories. A man must first of all be kind to his family and his own town and his own Province. There is a touch of home in New Ontario that is largely lacking in the prairie provinces.

Can you fancy a man living on a bare prairie? In New Ontario you can get the hemlock, the tapering spruce and the maple, and a soil that is set in lakes and framed by bays and rivers on which he may send or carry his produce to the Hudson Bay and from there to the markets of the world. That is what you have in New Ontario. You have a landscape and a waterscape which are totally absent to the great prairies, and this is what the son of Ontario will get up in that country. The Canadian Pacific Railway and the Dominion Government have brought the stream of emigration from the old lands to the North-west, and the older provinces of New Brunswick and Nova Scotia and Ontario have not had a chance of getting a great many of the emigrants owing to the great power of the Canadian Pacific Railway and the Dominion Government; but now it is the duty of the Government of these provinces to assert themselves and see that they get some of the grand old people of the old land, from which we have all sprung. I believe we will get them in the future more than we have in the past. We should colonize New Ontario instead of the North-west Provinces.

At the present session of the Dominion Parliament there will be a decennial revision of the Banking Act. You may think that a very extraneous subject to introduce at this time, but I do not think it is. If there is one thing that the agricultural class are interested in more than another, it is an independent audit of bank books at the head office. There were $829,000,000 on deposit in the banks on the first of January, 1910. That is 135 millions more than there were last year, and that is largely due to the savings of the agricultural class of the Dominion of Canada. You leave your money in the bank and you get interest upon it. But the banks do not keep it long in their vaults. They are lending it out, and it is your money that is doing this work. It is being lent into other lines of industry, and it is your duty to see that the bank is carried on in the right way. The inspection of the branches of the bank by its own officers is perfectly correct; but in view of past experiences, and in view of the loss that has been sustained even by men in this community and every other community throughout the Province, where men hold bank stocks, I say that we ought to see that there is incorporated into the new Act provisions for an independent examination of the statements that are published by the bank to the shareholders and the Government. What made it possible for the manager of the Ontario Bank to gamble with the bank's money in the City of New York? Because there is no independent audit at the head office. We want to steer clear of gambling general managers, and the speculative member of the board of directors, and we should require that there should be an independent audit at the bank's head office at the end of every six months and then we will have a watchdog at each office.

I thank you very much for this opportunity of addressing you, and I am pleased beyond what I can express at this particular opportunity, and I wish you a very happy and prosperous New Year. (Applause.)

The Chairman: On behalf of this Association I wish to thank the Mayor and Mr. Johnston for their very cordial welcome to the City of Belleville. It is not surprising to us that we received a hearty welcome at Belleville, because we have been here before.

DAIRY BACTERIOLOGY.

By W. T. Connell, M.D., Queen's University, Kingston.

I desire to submit to this annual meeting a report of the more important bacteriological work done during the past season in connection with our dairy instruction in Eastern Ontario.

Considerable attention has been devoted to pasteurization of whey, especially in its bacteriological aspects. Some 63 factories in Eastern Ontario have adopted this process and others have it in view. The main reasons urged for adoption of this procedure are, as I understand them:

1. Efficient pasteurization practically destroys the bacterial (germ) content of the whey. This has several effects: (*a*) prevents fermentation and decay of the whey during usual feeding period, *i.e.*, keeps whey sweet, rendering it more valuable as a food for animals; (*b*) prevents taint-producing bacteria being carried home in the patrons' cans, to be returned in next batch of milk, if cans have not been thoroughly cleaned; (*c*) destroys any disease-producing bacteria, *e.g.*, the tubercle bacillus which might possibly be in milk.

2. Pasteurization emulsifies the fat of the whey and incorporates it with the whey so that it no longer rises as a scum on the tank, where it is lost in so far as feeding value is concerned. Hence by incorporating the fat the food value is further increased.

I was particularly interested in the first part of the problem, especially to see if the methods of pasteurization adopted did actually destroy the bacterial content of the whey, and if not wherein the methods were inefficient.

Mr. Publow chose some four factories where the process of pasteurization was being carried out, considering that these would fairly represent the methods employed. Notice was not given to the makers, as it was deemed advisable simply to look into things as they actually were, not as they might be when fixed up for visitors. A travelling laboratory outfit was taken along and necessary specimens prepared and forwarded to central laboratory for detailed examination. In the *Farmers' Advocate* of Sept. 23rd, 1909, a fairly full account of the findings is reported, but the main points will now be stated.

TABLE I.—TEMPERATURE OF WHEY IN TANKS FOLLOWING PASTEURIZATION.

Factory.	Highest Temperature Record.	Temperature 1 hour after Pasteurization.	Temperature 2 hours after Pasteurization.	Temperature 4 hours after Pasteurization.	Temp. of Whey going into patrons' cans following morning.	Minimum and Maximum air Temperature recorded.	Whey Tanks.
M—Factory, Leeds Co..	°F.	°F.	°F.	°F.	°F.		Wooden tank; mostly underground; covered by whey-house; some slimy deposit on sides; not recently cleaned.
First day	153	149	144	137	120	66–76	
Second day	155	151	147	140	122	62–68	
C—Factory, Leeds Co.	157	152	147	......	100	66–78	Wooden tank; elevated; uncovered; cleaned partially on day of visit.
Hastings Co. Factory ..	160*	158	153	......	116	62–75	Wooden tank; elevated; covered; some slimy deposit on sides; not recently cleaned.
Northumberland Co. Factory	160*	156	150	......	96†	64–68	Wooden tank; half underground; well covered; some slimy deposit on sides; not recently cleaned,

*Whey albumen coagulated. †Due to running in cold water.

In pasteurization the temperature aimed at was 155 degrees to 158 degrees F. It is not advisable to heat higher, because when temperature goes to 160 degrees F. or over the whey albumen begins to coagulate and fall as a fine curd which accumulates on sides and bottom of tank. Further, no special advantage is gained by heating above 155 degrees F. in so far as destruction of bacterial life is concerned, while of course the higher the temperature is raised the more steam is required and the greater is the cost. It is possible that lower temperatures than 155 degrees F. when retained for considerable periods will be found quite efficacious. There is no doubt for example that under experimental conditions with average whey, a temperature of 145 degrees F. for 1½ to 2 hours is equal to 158 degrees F. for 20 minutes. If it is found that lower temperatures are as efficient, then of course the cost of heating will decrease. This is an aspect of the subject we mean to take up practically next season.

TABLE II.

NUMBERS OF BACTERIA PER EACH C.C.—PASTEURIZED AND NON-PASTEURIZED WHEY.

Factory.	Whey as drawn from vat (time of dipping).	Whey when heating completed.	Whey 1 hour after heating completed.	Whey 2 hours after heating completed.	Whey as it went into patrons' cans.	Whey at dipping, drawn into sterile jar kept till following morning at air temp.	Remarks.
M—Factory, Leeds Co.							The moderately large numbers of bacteria present in whey as it went into patrons' cans (Col. 5), due to entrance of wash-water and whey drippings after temp. of tank has fallen.
First day ..	19,800,000	7,500	600	15,000	150,000	110,000,000	
Second day .	14,000,000	150,000	200,000	200,000	300,000	12,000,000	
C—Factory, Leeds Co.,	53,000,000	1,500	700	1,600	4,000	532,840,000	Fairly satisfactory.
Hastings Co. Factory ..	10,500,000	1,000	1,000	1,250	1,900	112,000,000	Best results of series.
Northumberland Co., Factory.	49,000,000	800	80	60	4,500,000	440,000,000	The large number of bacteria in whey when it went into farmers' cans, due to running in of cold water, cooling tank to point where bacteria could develop.
M—U—Factory, Leeds Co.	19,000,000	not	pasteur	ized	260,000,000	....	Samples taken from tank of a factory adjoining one of above factories where pasteurization was not carried on.

Now of the four factories visited at two only was the temperature controlled by thermometer, the other two cheesemakers guessed at it. I must strongly emphasize the necessity for thermometer control to prevent underheating and to check overheating. At none of the factories examined did the pasteurization free the whey from all living bacteria (see Table II). But over 99 per cent. of the contained bacteria were destroyed, and those that escaped destruction were certain Sarcinæ and some spore-bearing bacilli, also some spore forming yeasts and moulds. These spores would require a boiling temperature for quite half an hour to destroy them, while the sarcinæ examined were not certainly destroyed till the temperature reached 176 degrees F. for 15 minutes. But even if the pasteurization does not entirely free the whey from bacteria, so long as we can keep the bacteria left behind from developing, they will not be able to effect any change. Now this can be done by retaining the whey above the germinating or growing point of these bacteria which is under 108 degrees F.—in fact, is, as a rule, under 104 degrees F. Hence it is important in the pasteurization of whey to have a whey tank that will retain heat. The tank should be covered and whether underground or elevated is best insulated. When so constructed the whey ought to go into the patrons' cans at a temperature of 120 degrees F. in the warmer months of the year and over 108 degrees F. during May and October. At one factory (see Table I.) the whey stood at 122 degrees F. one morning, and at another at 116 degrees F., while in a third with an elevated uncovered tank the temperature was 100 degrees F., but in the last case the air temperature stood above 70 degrees F.

In none of the four factories were the whey tanks well cared for, and on the walls of these tanks above the whey line, where moistened and provided with food by whey splashes, myriads of bacteria were thriving and were occasionally washed into the tanks. Pasteurization ought not to replace cleanliness in any way, even though it renders the necessity for it less apparent than before.

TABLE III.—ACIDITY OF WHEY.

Factory.	Whey as drawn from vat at time of dipping.	Whey when heating completed.	Whey one hour after heating completed.	Whey two hours after heating completed.	Whey as it went into farmers' cans following morning.	Whey at time of dipping, kept in sterile jar over night.	Remarks.
M—Factory, Leeds Co.							Increased acidity of morning's whey, due to drippings from curd.
First day...........	.19	.19	.19	.20	.25	.48	
Second day.........	.17	.19	195	.20	.28	.42	
C—Factory, Leeds Co..	.19	.27	.27	.27	.27	.55	Increased acidity after pasteurization, due to retained whey in tank.
Hastings County. Factory............	.20	30	.30	.30	.34	.49	Increased acidity after pasteurization, due to retained whey in tank.
Northumberland Co. Factory	.17	.32	.32	.32	.35	.58	The whey left behind in tank (only a small amount) had an acidity of 1.42 on morning of my arrival.

At two of the four factories investigated the results of pasteurization were vitiated or spoiled by defects in the after care of the pasteurized whey. Thus at one factory it was the custom to allow the whey draining from the curds and also the washings of the milk vats to run into the whey tanks, of course untreated. Now with these whey drainings and washings, great numbers of bacteria were carried in at a time when temperature would be too low to destroy them, but still high enough to prevent their development. At the second factory it was the custom to run about 80 to 100 gallons of water along the whey gutter into the whey tank at close of day's work. This water also carried many bacteria and its bulk cooled the whey very quickly. (See Table II.). In other words, at these two factories lack of knowledge on part of the makers was partially neutralizing the effects to be expected from the pasteurization.

As a means of control of the efficiency of the pasteurization, a test of the acidity of the whey affords a good index. The acid producing bacteria are the ones which are most readily and rapidly destroyed by the heating, and when pasteurization is properly carried out and whey tank is covered and sufficiently insulated the acidity will often not rise above .22 to .24 as tested by usual alkali test. An acidity rising over .30 means some failure in process, either insufficient heating or the entrance of material carrying acid forming bacteria at a time when temperature has fallen sufficiently low to permit of their retaining their vitality and developing when temperature falls to a point where germination is possible. Table III. will illustrate this very well.

One point which has been urged against pasteurization (but which to me does not seem to bear much weight) is that by destruction of the usual acid forming bacteria from whey, the more resistant bacteria and especially the spore bearers would have then an excellent chance to develop if cans in which whey was returned were not well cleaned when milk was placed in them. In examining the milk supplies of the factories I did find in all cases spore-bearing bacilli, but these did not seem to be more abundant than in ordinary dairy milk, *e.g.,* as one purchases from milk delivery waggons in city of Kingston. Further by the use of a proper starter the necessary acid forming (lactic) bacteria can be furnished. I will leave it to others to speak of the value or otherwise of pasteurization in checking bacterial taints and in increasing the feeding value of the whey. I feel justified in concluding, however:

1. Heating in bulk of whey to 155 to 158 degrees F. destroys over 99 per cent. of the bacteria, but under ordinary factory conditions never sterilizes the whey, as certain sarcinæ, spore-bearing bacilli and moulds can be grown from whey so treated. But these bacteria do not increase in the whey tank unless the temperature falls below the germinating point (108 degrees F. and under).

2. Heating to 155 degrees F. gives as good results as higher temperatures, and to avoid coagulation of the whey albumen, and thus destroying the uniformity of the whey, the temperature should not go above 158 degrees F.

3. The thermometer should be the means employed to test the temperature, not the length of time steam is turned on the tank, or other methods found in use in some factories.

4. In a properly-constructed, covered tank in our summer season, the whey will retain sufficient heat to go into the patron's cans following morning at 115 to 122 degrees F.

5. The acidity of whey when going into patrons' cans affords a good indication of the efficacy of the pasteurization, and ought never to rise over .30 lactic acid.

6. No washings, water or other matter should be added to whey tank after heating is completed (unless such are first pasteurized).

FARM AND FACTORY WATER SUPPLIES.

Another subject to which considerable attention has again been given is that of water supplies at factories and at farms. During past year over two-thirds of such samples submitted have proven to be infected with dangerous forms of bacteria. I class as dangerous those forms which can be traced as originating from the intestinal discharges of animals or man, or in the case of factories as coming from factory drainage or whey. Of course it must be remembered that I am only sent samples which have fallen under suspicion, so that my figures do not represent the condition of the farm and factory wells in Eastern Ontario. Still I think I can state that quite one-third of the wells at farms and factories are so situated as to be open to pollution from surface drainage or from seepage from manure piles, stables or pig-pens, or from house wastes. I find it a difficult matter at times to convince factory owners, etc., of the correctness of the reports, and have often had flung at me when my report has condemned a farm house supply that the water has been used for twenty or thirty years without falling under suspicion, hence my analysis must be wrong. Even the sight and smell of polluting material fails to convince some. I can best illustrate this by telling what I myself saw this past season at a factory shortly after it had been rebuilt on site of previous one. The factory was quite well situated on a sandy ridge, and very little care would provide good drainage, and with that a good water supply could be assured. The floor of the make room was of cement, and there was a gutter which served as whey drain, and as drain for washings (a very common and very bad system from a sanitary standpoint). This gutter connected through the wall with an elevated, open trough, with very frail supports which ran to whey tank some 30 feet away. There was no outside drain, and the connection between the gutter and open trough permitted considerable splashing. Now the well was within 12 feet of this connection, and inside the engine room, with mouth covered by open grating through which ashes, chips, etc., readily made their way; further the soil about the well was a loose sand. One day the whey trough fell down but the whey was run out just the same, and of course the well became the whey tank that day. But this fact did not stop its use, nor did a similar accident a few days later. The cheese began to be complained of, then were cut in price, and next the assistance of the instructor was wanted to assist in determining what was the matter. By this time the water was very foul, but it did not enter into the cheesemaker's or owner's head that this could be the trouble—it only had whey in it, you know. A visit by Mr. Publow and a plain talk of what had to be done at once convinced them, but it cost them $400 in cuts in price of cheese.

My point is that if it was difficult to convince people when there was visible indications of pollution in the water, and when the nose made one aware of it when one entered the factory, how much harder it is to convince men, when such tangible evidences are lacking. It seems to me to be an essential that factories and farm well waters should be safe to use—should, in other words, be free from pollution by excreta of man and animals; there should be more care of factories from the drainage material, more care taken in the location of wells, in the protection of their mouths, and in seeing that drainage matter and excreta are not permitted to foul the soil in the drainage area of the well surface.

MR. RUDDICK: You spoke of the whey in the tank retaining temperature at a sufficiently high point to prevent further growth. Supposing you were using steel tanks and the weather was very cold, would you not think it would be advisable to insulate the tank by a covering of wood?

Dr. Connell: Decidedly. Of course when a tank is under ground it requires no insulation, but when it is elevated it certainly does. In one tank this summer, which was uncovered, the temperature the following morning was 100 degrees. In the case of the other tanks which were covered and more or less insulated, the temperature never fell below 120 degrees.

CREAMERY WORK IN EASTERN ONTARIO, WITH SUGGESTIONS FOR IMPROVEMENTS.

By F. Singleton, Dairy School, Kingston.

The creameries which I have visited during the past season are situated largely in the counties of Ontario and Victoria.

The make for 1909 is about the same as that of the previous season, some creameries showing a slight increase in make, while others show a slight falling off. The average selling price of butter for the season was slightly lower than that of 1908.

My work and time during the past season has been entirely under the direction of the Chief Dairy Instructor, Mr. Publow, and I visited the creameries at such times as instructed to do so by him. In all I spent about sixty days on creamery work, travelling, calling on creameries and creamery patrons.

The butter, as a rule, has, in my judgment, been fairly well made during the past season. In a few creameries there was some slight unevenness of color in the first few days' make, but otherwise the work, as far as was within control of the maker was usually well done. The flavor of the butter is not all that is desired, but in only one creamery, as far as I know, has there been any serious trouble in this respect. About fifty-five samples of butter were tested for moisture content and showed an average of 13.63 per cent. The moisture content usually ranges between 12.5 and 15.5 per cent. In three of the samples tested the moisture content exceeded the legal limit of 16 per cent.

In considering this subject, " Creamery Work in Eastern Ontario, with Suggestions for Improvements," it will perhaps be best to consider it from three different standpoints; first, the buttermaker; second the creamery, and third, the creamery patron, and consider the weaknesses and requirements of each.

The makers are, as a rule, quite competent men, men who in many cases own the creamery they are managing, and have had a long experience in the business. Of the sixteen I visited, seven were dairy school graduates, four had attended a dairy school but had not graduated, and five had not attended any dairy school. The two or three men of the sixteen whom I consider poor men are included in the last five, and these men should take some steps to make themselves more proficient in their work.

The *creameries* are generally clean and sanitary with good water and good drainage. Two of the creameries installed septic tanks during the past season, both of which are giving excellent satisfaction. Of the sixteen creameries I visited thirteen are equipped with concrete floors. The refrigerators are the weakest part of the creamery equipment, and in many cases should be improved, as not over five of the sixteen creameries I visited have suitable refrigerators. As nearly all our creameries are now operated on the cream gathering plan, the haulers' outfit may be considered as a part of the creamery equipment.

Two of the creameries use individual cans, one only is using the tanks, and thirteen are using the jacketed cans, which are, except at one creamery, in very good condition. The individual can has much to commend it, as the creamery manager has an opportunity to examine each patron's cream and usually a better raw material is secured when delivered in individual cans.

One creamery provides tarpaulin covers to protect the gathering cans from sun, rain and dust, and this is something with which every cream waggon should be provided.

Practically all of the cream is collected only twice a week. It would be better were it colllected three times each week, yet it appears that the business must expand in the average creamery before it will be profitable to gather oftener than twice a week. Cream can be delivered sweet and in good condition and only gathered twice a week if a fairly heavy cream is separated and properly cooled.

Coming to the patrons' side of the question we find more serious difficulties. Many patrons are either dissatisfied with the business, or indifferent to it. The dissatisfaction is largely over the testing of the cream and this is a problem which creamerymen must consider before long. In fact the trouble has become quite acute in some sections, and one prominent creameryman has said that this is the most difficult problem with which creamerymen have to deal.

In the first place there is no uniformity among the different creameries in methods of testing. Some use the 17.6 c.c. pipette and do not rinse it after taking the sample; others rinse it after taking the sample and add the rinse water to the test bottle; others use the 18 c.c. pipette either rinsed or not. None are using the scales to weigh the sample. The difference between using a 17.6 c.c. pipette not rinsed and an 18 c.c. pipette rinsed, with the rinse water added to the test bottle, will make a marked difference in the reading of the same sample of cream. This lack of uniformity and this inaccuracy in testing has two evils. First, a correct comparison cannot be made between the price per pound of fat paid at different creameries, and secondly, any method of testing by means of a pipette will not do justice to the different patrons.

The creamery using the 17.6 c.c. pipette and not rinsing it does not credit the patrons with all the fat they deliver, consequently a higher over-run is obtained, and an abnormally and fictitiously high average price per pound of fat is paid.. The neighboring creamery may be using an 18 c.c. pipette and rinsing it after taking the sample. The over-run is not so high, neither is the price per pound of fat, but the patrons get as much money, other things being equal, in that they are credited with more pounds of fat. This causes dissatisfaction among patrons of both creameries, in the first creamery over the lowness of the test, and in the second creamery over the lowness of the price.

The Babcock test is based on weights, and it is simply for convenience that we use a pipette in testing milk. Milk is fairly constant in weight, so we can use the pipette in testing milk and get accurate results. But with cream we have an entirely different proposition, for it may vary in fat content from 11 to 50 per cent., or even higher. As fat is the lightest constituent of cream, the more fat cream contains the less will a given volume of cream weigh. This explains the inaccuracy of any pipette in testing cream. An 18 c.c. pipette rinsed and the rinse water added to the test bottle, will with a 27 per cent. cream deliver the correct weight into the test bottle. As the percentage of fat increases the sample becomes lighter, and the test is too low, while as the percentage of fat decreases, the sample becomes too heavy, giving too high a test. This simply means that where a pipette is used in doing the testing, the man sending rich cream does not get paid for all the fat he sends, while the man sending cream containing less fat than 27 per cent. will get paid for more fat than he sends, and the greater the extremes the greater will the error be. The patron is advised by creamery men and instructors to get the test up somewhere between 30 and 35 per cent., and this has many advantages, yet the testing is done in such a way as to put a premium on low testing cream. The remedy for this is to use the scales and weigh each sample into the test bottle and each patron will get paid for what he sends. The use of the scales in cream testing will do away with much of the friction with and dissatisfaction among creamery patrons.

The sampling is usually quite accurately done by the hauler, but the samples do not in some cases receive the attention they should at the creamery. The samples should be warmed up occasionally and the preservative mixed with the fresh cream. They should be kept well corked, as, if left uncorked, moisture evaporates, leaving the test too high. This has no doubt been responsible for some low over-runs.

Another great reason for the indifference of many patrons to creamery work is that with the average patron the business has not been profitable. According to Mr. Publow's report, the average production per cow for the six months, May 1st to November 1st, was about ninety pounds of butter. The average selling price of butter was 23½ cts. Deducting four cents for hauling and making this nets the patrons 19½ cts. per pound of butter, or $17.55 per cow for six months. This is not profitable and is no doubt responsible for many a patron's indifference to the creamery.

The quality of the cream as delivered to the haulers is not all that could be desired. First class cream to my mind is cream that is clean in flavor, testing 30-35 per cent. fat and sweet. Much of the cream is not clean in flavor, is too low in fat and it is practically all sour. This conclusion is the result of visits to some 250 farms with the cream haulers and examining the cream as delivered to them. As a result of the cream being in this condition there is no ripening done by the creameryman. Butter-making in the average cream gathering creamery consists of cooling and churning the cream as soon as possible. The butter from such cream will with proper handling have good body and texture, but the flavor may usually be described as "not clean," "high acid" or "old cream." I have in my visits to the farms tried to point out to the creamery patron the necessity of having the cream in better condition and there have been good results from this work. This work of visiting the farms is important, and has been appreciated by the creamery men and appreciated most by the best men. More of it should be done, yet it is difficult to see how an instructor with the time at his disposal can visit a high percentage of all creamery patrons, and it seems that creamery men should do more of this work.

Assuming that the farms I visited represent average conditions, and I believe they do, 50 per cent. of the separators are in unsuitable locations, 75 per cent. are washed only once daily, while only 1 per cent. of the patrons make any attempt at cooling cream, other than placing it in a cellar.

The separator should be in a clean location, where the atmosphere is pure and should be washed after each time it is used, as it will not only give the cream in a more cleanly condition but will do more efficient separating. The practice of washing the separator only once daily is a filthy one which should be discontinued.

The average percentage of fat in the creameries I visited east of Lake Simcoe is 27 per cent.; west of Lake Simcoe it is 19 per cent., while for all it is 26.1 per cent. Taking a fairly rich cream, say 30 to 35 per cent., has many advantages over thinner cream:—

1. Usually the cream is delivered sweeter and of better flavor.
2. More skim milk is left on the farm for feeding purposes.
3. There is less cream to handle, cool, and haul.
4. Usually a slightly higher over-run is obtained on account of more moisture remaining in the butter from the heavier cream.

To illustrate this last point the average fat in the cream for all creameries was given as 26.1 per cent., and the average moisture content as 13.63 per cent. The average percentage of fat in the cream received at the creameries west of Lake Simcoe was 19 per cent. The moisture content of the butter in these creameries averaged 11.96 per cent. The average percentage of fat in the cream received at the creameries east of Lake Simcoe was 27 per cent., while the moisture content averaged 13.95 per cent.

Lastly the cooling. If the cream is to be delivered sweet it must be cooled as soon as separated to a temperature in the neighborhood of 50 degrees. It may then and not till then be mixed with older cream. Every creamery patron should put up a supply of ice and use it for cooling cream. Many creamery patrons now store ice for household purposes but do not use it for cooling cream as the creamery has not demanded an improved raw material. If the cream were all delivered sweet, the improvement in the quality of the butter would demand a premium in price that would well repay the patron for his extra time and labour.

THE CHAIRMAN: We are glad to have a representative of the Montreal exporters with us. He is well known to every dairyman and every cheeseman in Eastern Ontario. There used to be a time when we thought the cheese buyers wore horns and hoofs, and we thought they were very bad men, and that they monopolized all the money in the business, and were a kind of necessary evil; but I think that idea is now pretty well blotted out, and we have got to understand that the cheese buyer of Montreal is a friend to the dairyman, and that he handles our product to the very best advantage. There is a class of people in Ontario who think we ought to do away with the middle man, and that we ought to take our cheese to the other side and sell them there; but if we do that we have to sell them through middlemen there. My idea is to encourage just as many of these merchants in Montreal and other places who are handling our exports, so as to have sufficient opposition, and I believe in the end we will get more money for our products than by any other means. I am very glad indeed to have this representative man here to speak to us to-day. He will probably give us some information as to how our products are handled, and what prospects there are for the trade for another year, and what the buyers have done with the products for the past year. I am sure we will be very glad to listen to MR. HODGSON.

A CHEESE MERCHANT'S ADVICE.

BY H. H. HODGSON, MONTREAL, QUE.

I am here almost by accident. I did not know that I would be asked to come here, as my brother was going to be present; but he found it impossible to get here, and I was very glad to come back to Belleville. It is like coming home, because I lived here six or eight years, and I know you will give me all the indulgence I might ask. I listened with a great deal of pleasure to Mr. James' address last evening, and I noticed that he said there were one hundred millionaires in Montreal and ten millionaires made this year. I asked him if he found any cheese or butter men among the lot and he said he did not. And I can assure you, you will never find cheese or butter millionaires. We are philanthropists in Montreal. We believe in the doctrine that man cannot live to himself, and that he must go to work and give out to others. We have got to realize first of all that we are the people in this Dominion of Canada, and we take the lead as far as money is concerned in the results of this business of the cow.

I have a pamphlet before me on the interest of commerce in promoting International Peace. I will read the first part: "It requires no argument to demonstrate the influence of satisfactory commerce relations in maintaining a secure and enduring peace between nations. It is one of those things which logic teaches and history confirms. The basic principle of this great silent influence is mutually of interest. The same restraining forces are at work to build up friendly relations between two countries engaged in commerce with each other as operate to prevent a quarrel between business men and their customers or a lawyer and his client." Now this mutuality of interest is what tells. One man may have a little more money than another, but after all we are all on the same level.

We have at the head of our Dominion Dairy Department, Commissioner Ruddick, a man who does not need any eulogy from myself, actions speak louder than words. We have also Mr. Publow and the instructors under him. We merchants in Montreal are concerned in this matter. I want to say for Montreal, that it is the best thing the Easern Ontario Association ever did to have these instructors and to have such a grand man over them. (Applause.)

We find this year that you are going to register the factories, and this is a step in the right direction. Next year you will probably license cheesemakers, and that will be another step in the right direction. We are not standing still; we are going forward and not backward. You have made marked progress in the manufacture of cheese right from Prince Edward Island to Sarnia.

I do not want you to be puffed up, and put your knees back, and stick up your feet and smoke your pipe, and think it is all right. Eternal vigilance is required if you want to attain to the height which you are aiming at—if you want to manufacture goods that will sell themselves, and do not require a man behind the gun to sell them for you. I wish I could transport every cheese maker and every president of a factory to Montreal and have you in our office for two or three months and then you would see the immense amount of work you give us to do. We have to employ men first of all to do nothing else but to stencil the weights on the boxes. I am glad to say that fully one half of the factories coming down to Montreal have sent them with the weight stencilled, and that is an improvement. We are not here to grumble, but there are some sections that have made more rapid advances last year than the year before. One section especially has adopted this plan, and they have splendid boxes, and they are cut from three strips instead of four, and are made thicker, and they are all uniform and have one standard brand for the section. They put the factory on first and then the number 1, 2, 3, 4, and they give the number of the cheese board. And this year I have no doubt they will put a registered brand on each, and then if they put Canada in with a nice rubber stamp in red ink and then stencil the weight on the box, and they are very carefully weighed, when these go over to England there is no trouble. This has been adopted in four sections, Madoc, Campbellford, Sterling, and Belleville. I think Brockville might change their design. I like a smooth clean surface on top of a box.

Cheese are sold in England by sample. They are first of all taken into the sample room, and of course the nicest boxes offered there get the highest price. Sometimes they say it is hard to get a good sample because boxes arrive there in such a broken condition. If the boxes are all right and nicely branded, it has the same effect as a man with a clean face. If he has a dirty face you don't want to have much to do with him.

When an Englishman sees anything he wants he takes it. He is not like men in this country, who want to see everything, and then make their pick. We have been looking after the boxes better this year than before. We have done away with the sling, and they now use big boxes for the cheese, and they are trucked in, and then the large boxes are lifted up and put in the hold, and each man takes one by itself and carries it by itself and they come over in better condition.

Two years ago a gentleman came over to my warehouse from England, and at the time he arrived we were loading our waggons with cheese. He said, "Do you handle your cheese like that?" and I said, "That is the way they leave; the boxes are in perfect condition." He said, "I would give one shilling a hundredweight more, if you could land them in that way."

I offered to supply these stencils to the factories, but we have been turned down. The poor cheesemaker says he has not got time to stencil the weight on the boxes, and if he cannot do it nobody else can.

In a factory in Western Ontario they had a committee of directors who sometimes went down to the station, and if they saw a box come down that was broken it was sent back to the factory to get a new box. And I think you ought to do that. If you have directors on your factory, you should make them work.

I am glad to announce that we have only had one case of filled cheese, and I am glad to say that that business is about done, and I hope it will be done away with altogether. This was colored cheese, with white cheese put in the centre in the hope that we would not find it. But we just happened to send our tryer up to the hilt, and we got a little bit of white cheese and we got it cut in two at once. Three years ago in England I was bitten by a lot of 15 boxes of cheese, and I had to make 3 shillings allowance, and I could not get that back from the factory because six months had gone by before it was discovered. I want you to try and help us, and we will help you. You cannot make your cheese or butter too fine, for the finer you make it the better people like it and the higher prices you get. The trouble is we have had too many second and fourth grade cheese in the past.

You know that you take the best you can buy and it is the same with the Englishman. I would like to feel that we are getting into higher realms of business, and I believe that commerce is going to make peace in the world. What is Germany building these big ironclads for? Simply to secure peace and protect commerce. The idea of war makes you shudder. We do not want to have any warfare with England on the quality of our produce, and we do not want to have any cross words. We want to keep our interests together, and we want to give them what they want and produce what they want. I know that you have been anxious about the milk supply, and if you will only take in all that has been said and done then I think we will have a future that will be a brilliant one, and we will have no more trouble about the quality of our goods. "Righteousness exalteth a nation, but sin is a reproof to any people." I use that expression in all solemnity and seriousness—the right way of doing things. "Uprightness in all things exalteth this dairy industry, but the sin of milking poor cows will do a lot of harm."

A dairy exporter said to me, "I would like to be in the place of the farmer because they are better off than I am." When milk is up and prices are good, he says, "Cow bossy," and strokes the cow's neck, and does all kinds of nice things for the cow; and then the cow gets in a nice gentle frame of mind and gives lots of milk in the pail. But when the milk is low, and things do not go right, the hired man kicks poor "Cow bossy," and uses strong language, and the consequence is that the cow holds the milk up and it does not go down into the pail, and we do not get the yield we should get, and when the markets are low we do not make the money we ought to make.

It is said that a lady in Wisconsin when her milkers go out to milk her cows takes a guitar with her and plays to the cows. She has a herd of Jerseys and she sings to them. Sometimes she sings a gay song, other times, "Where are you going, my pretty maid? I am going a-milking, sir, she said." (Laughter.) She pets the cows and makes great friends of them and she calculates that she gets, as a result of singing to the cows when they are being milked about 3,000 pounds more a year from each cow. She has them so tame that they really like her. What we want is better milk, and that is how the English beat ours in flavor, and that is the only way in which they do beat us. I do not think they beat us when it comes down to the actual quality of cheese. We have more fat in our cheese than they have, and I will give you an example. My brother lives in England. He put before me a piece of Cheddar cheese, and I said to him, "That is not good; I will get you a piece of real prime Canadian Cheddar." He said, "You cannot beat that English cheese." But I went to Lipton's and got a piece of Canadian cheese that came not far from Belleville. I got a nice fat solid piece, there was not a crack in it, and I took it in and he had to own up that it was the best; and ever since then he has always used Canadian cheese, and I always ask for it wherever I go. (Applause.)

SENATOR DERBYSHIRE: How delighted we are to have these merchant princes with us. They handle this vast product during the year, and I am sure we have all been pleased with the interesting address we have had from Mr. Hodgson. We would have liked to have had a great many more of the exporters from Montreal visit our Association so that we could get acquainted with them, and see the men that are handling our product from year to year. All Mr. Hodgson has said about the boxes is important. It is an easy matter to have them a little heavier and have better boxes. I would like you to think over the address we have had from the young man from the Kingston Dairy School. I would like you to think over the style of that young man, and I want you to understand that he was educated in our own Kingston Dairy School, and that the young men who go to the Kingston Dairy School for education come right in contact with this young man and Mr. Publow, and these other men who are so eminently qualified to fit them for better positions and to raise the standard quality of the goods throughout Ontario. Every cheesemaker in Ontario should go down to Kingston Dairy School and get a training from these men. (Applause.)

MR. M. K. EVERTTS: For the past two years I do not think there is another nation that has made the progress that Canada has, and the eyes of the world are upon Canada to-day, and it is up to the farmers of this country to see to it that the opportunities that we have should be taken advantage of. You all heard what our cousin from the south said last night—that it will be only a very short time before the people of Canada will be feeding them as well as the people of Great Britain. They want our cheese and butter. The duty upon the necessaries of life which they have to pay will not be tolerated much longer. Their census will show a population of 90,000,000, and 60 per cent. of their people are living in villages and towns and cities, and there are few working the land. The leader of the Opposition in the House of Representatives for Missouri told them last week that the Argentine Republic out-stripped them in the exportation of wheat and corn, and said that in five years the United States would have nothing to export, and they would be coming to Canada to buy their butter and cheese and poultry and eggs and products of that sort necessary to live, and what the people have got to have. If Mr. Taft's election were to come on to-morrow he would go down like a June frost before the hot sun. The laboring class are rising in their might, and they are looking to Canada to feed them. You know that they have been stripping the frontier of this country, from Quebec to Sarnia, of our cream; and if they put on a duty of only three cents a pound on cheese they could come over here and buy it.

Before five years roll around, Canada will have three of the largest markets in the world—that of Great Britain, the United States and our own North-west.

I am delighted with addresses I have heard to-day, and I was delighted with the remarks of my esteemed friend, Mr. Singleton. I think we should be given a chance to ask questions from such men as Messrs. Ruddick, Barr and Publow. I was delighted with Mr. Publow's report. We have grand men filling positions in Eastern Ontario. No country in the world has a finer class of men than we have right here. Take a Canadian boy and let him drop anywhere, and he will light on his feet like a cat. They are seeking such men the world over, and our Canadian boys make a name for themselves wherever they go. Canadian is the only qualification that is asked, and if you come from Canada that settles it. (Applause.)

SOME THINGS WE NEED.

Dr. C. A. Publow, Cornell University, Ithaca, N.Y.

If you had noticed my expression since our good friend, Mr. Murphy, invited me to come over here, it would not be at all necessary for me to mention the great pleasure it gives me to meet with you again after an absence of a little over two years in the country to the south of us.

It has always seemed to me that dairymen in Ontario take the greatest amount of pleasure out of these annual conventions, and the only explanation that suggests itself to me is the fact that the dairymen in all branches of the work are able to bring out the problems they have encountered during the year, have them discussed, and have remedies suggested. Then you are satisfied, and when persons are satisfied they are happy and when happy they show it. So I suppose this is the reason why the dairymen of Ontario are such a happy-looking crowd.

I wish I could say the same thing about the dairymen of the State of New York. I wish I could bring them all over here, just to have a look at you, to see how you do things, and to see what a dairymen's convention really ought to be. I have great ideas of the amount of good they would receive from your example.

This winter at our convention held at Watertown we had the honour of addresses from your Dairy Commissioner, and from your Chief Dairy Instructor; and while I know these gentlemen were somewhat disappointed in the attendance, I want to say that this is one reason why the Canadian experts were invited; to come over and give new ideas and create new enthusiasm. You cannot get along without a little Canadian blood even on the American side. The dairymen of New York

State have not had the best methods of dairy instruction, and we have a very large amount of slowness on the part of cheesemakers and buttermakers especially, to accept instruction of any kind. But this prejudice we are gradually overcoming, and from your example and our own efforts we hope some day to have conditions as they ought to be.

Dairying, however, is not by any means a failure in the State of New York, and there are a few successful phases of which Canadians might well take note. If you will allow me, I would like to start with the first factor in dairying, and going along the line make briefly some comparisons of the things we need.

We have all been very much interested in the experiments of Mr. Barr in connection with the preservation of milk, and it seems to me that this question of clean milk is the one which must decide the future of the dairy industry. The farmers of Ontario, as a rule, are doing much toward this end, but in the methods of caring for milk I must say that the farmers of New York State are much ahead. In this State you seldom see an open milk stand located close to a barnyard, hog-pen, whey barrel or roadside. They are giving as much or more attention to cleanliness as they are to cooling. In other words, we believe in keeping the dirt out of milk altogether; then we do not have to worry about cold or other methods of preservation, because if the dirt once gets in, no method of cooling will ever restore the pureness that has been lost. With this end in view, we find our stables being rapidly cleaned up and whitewashed. The cows and milkers are clean, and not by any means the least is the use of the small top milking pail. Practically every dairyman has his little milk-house, where milk only is kept, and practically every farmer has a supply of ice or cold water to be used in connection with the Star milk-cooler, which is now invariably used. This is really the strongest feature of dairy work in New York, while in Ontario, I believe, it is the weakest. Apparenty New York farmers have been quicker to realize the unequalled value of care and cleanliness in the handling of the raw material in this respect. Now, why should Ontario, with the best factories, the best makers and the best system of dairy instruction in the world, be behind in this great, yet simple detail? How long will our Ontario patrons continue to place the cans of fresh milk upon an open stand close to the roadside. where the polluted dust may enter in clouds, or in close proximity to the barn-yard, stable, hog-pen or whey barrel; all of which give to milk its meanest odors? Why not have a neat covered milk-house with convenient cooling facilities, and why not have a clean whitewashed, well lighted and well ventilated stable, and use a milk pail that will keep out at least three-quarters of the contamination? Does not the business deserve it? You and I are not in this business for a day, or a year, but for life, and it will go on after we are gone. Then why shouldn't we get fitted up to make the best of our greatest industry and the greatest source of maintenance and profit?

We sometimes ask ourselves what are we getting in return for all these imimprovements we are making. Do all these modern practices bring us increased profits? And we sometimes feel they do not. But let us look at it the other way. How much would we lose if we did not do these things? What would be the result if we left undone the little things that cause us extra time and labor? Then let us go back to the time when we had no dairy instructors, no dairy conventions, when bacteria and methods for their control were unknown. Ask any of our older and more experienced men, men who have produced milk for 50 cents a hundred pounds, men who have worked for long seasons with little compensation, using the early methods that meant brain worry both day and night; ask these men who have kept abreast with the many changes, men to whom we younger men owe much, and from whom we have still much to learn; ask these men what has been the value of our new fangled ideas. Experience and common sense is all we need to give us the realization of what has been our good fortune.

Think of the advances that all branches of science and industry have made. Let us remember that the nations of the world are in competition, and that in the great struggle for existence and success it is only the strongest who can survive. Many nations now follow dairying. The new countries have the advantages of the successful methods of the old; and they have the increased ambition to succeed and advance. Our old school fable of the hare and the tortoise is still too true. It is the one who keeps moving on that wins the race. Fellow-dairymen, let us not forget that we are in a great race for supremacy in the dairy markets of the world. Many are the competitors that will take advantage of us if we lag or stop to rest. Then with our present advantages, of which we should all feel proud, let us enter into the work of a new year determined to make our country envied, honored, respected and loved for the cleanliness, the honesty and the purity of the products of the deserving old cow. So much for the farmer.

Permit me to say a few words which may apply more directly to the men who make the cheese. I want to say first that you are internationally recognized as the best cheesemakers in the world, and I feel proud to be classed with you in anything of so high a rating. But let me say also that the making of cheese in itself is not the only accomplishment for us to observe both in the future and right now. What reputation we may have, we have won by doing things, and if we are to hold our good name, then we must keep on doing things. A baseball championship is won or lost in a single game, and one may be responsible for either; a horse may lose a championship in less than two minutes; the Americans lost the European export trade on cheese in a single season. It is hard to keep on top, and we cannot do it by standing still. New Zealand and others are after our markets, and we as factory managers must do more than manufacture cheese.

At present you have in Eastern Ontario about thirty dairy instructors. In the State of New York we have but six cheese instructors, but we have over 1,400 persons whose duty it is to instruct the farmers in the production of clean milk. Now to my mind there is no reason why every factory manager should not be a dairy instructor. He knows, or should know best, the needs of his own patrons; he meets them or can reach them any or every day, and if he is the right kind of chap they will do as he asks. Think what it would mean to have 1,000 such instructors instead of 30, right here in Eastern Ontario. The regular instructors are all right, but they only get around about once a month. It seems to me, then, that if the makers would do their part it would only be necessary to have the instructors attend to difficult or obstinate cases which the makers might not be able to handle, and results would be much more noticeable. We say we are kept so busy in factory work we cannot find time to look after the patrons. But we can. I have been long enough in factory work to know we can. The trouble with most of us is we do not know how and do not try to find out. I tell you, men, we don't do enough. We do not think enough. We are more like transfer companies carrying other men's ideas. Why do not we have more originality and more enthusiasm in our work. This country gives us strong bodies and brains. We use the body too much and the brain not enough. We talk about cheesemakers' unions and raising the wage scale, but let me say right here, that the best union we can have is a union with the patrons of our own factories. This is the union that will determine a man's worth and his salary; the union that brings greater profits to the farmer and the one co-operative necessity in successful factory management. We ought to be more diplomatic. Do not tell me you cannot visit the patrons.

We criticize the farmer, but the farmers are the finest people in the land. They are most generous in their own way, and willing to do the best they know how. They are conservative and content to let well enough alone till something else proves better, and we cannot blame them. It is up to us to show them the things that are better. The milk business is theirs, the product is theirs, and they should control their business. Did you ever stop to consider this peculiar and unique state of affairs? Farmers hire a man to work for them, but unconsciously the farmers work for the factory manager instead. They take his orders and his abuses, and in the great majority of cases do as he bids them. Now surely this should not be the case. It is so in no other business that I can think of. The farmers should know better their own part in the work, and then be able to control the men they employ. Then and only then will our factory managers be compelled to perfect themselves in their chosen professions in order to hold the select positions and demand the larger salaries.

Let us have a little more individualism and personality in our work. Many indeed are the successes we can earn if we accept and make use of the advantages that are ours. We should improve our personal appearance when at work, we should take advantage of the weather conditions and markets in the making of the most cheese that good quality will permit. We should put our product up in better styles to entice the buyer and increase consumption. We should have greater co-operation with our dairy instructors, and we should improve the appearance and surroundings of our factory buildings. Make these places that are too often recognized by their smell, models of neatness and purity. These things require but little time and labor, but they will do much to improve the man and the business and to elevate profession in the eyes of the public.

In closing I would say to the farmers especially, that you should share your prosperity with your factory manager. If fortune has favored you with high prices for your milk and cheese, pay your cheesemaker accordingly, and do not offer the factory to another man the following year simply because he is willing to work for less money. That type of man can bring you no good. In the first place he is degenerating himself and his business, and he will degenerate you if you take him in. Old fashioned facilities will not do for the modern business. We do not want the old time cow, but let us have the best. Then give her the food that she always needs; give her the home that she surely requires; give her the air that her health demands, and give her product the care that its purity deserves, and you will have accomplished all that can be asked of a good Canadian dairyman.

And to the makers I would say that you are doing much but can do much more. I am sure you will all agree with me when I say that we have not been of the greatest usefulness unless we have left the business in better condition than when we took hold of it,—unless the people have been helped, and the country has been better both morally, mentally and financially because we have been in it.

Q. Do you make whey butter on the other side?

A. Yes, our losses are greater there than they should be. We are not making as much there as you are here.

CO-OPERATION IN AGRICULTURAL EDUCATION.

By G. C. Creelman, President O.A.C., Guelph.

I bring you greetings to-night, as it has been my privilege for some years, from the Ontario Agricultural College and Experimental Farm. I am pleased to say to you it is full at this time to overflowing. We have one hundred more students in Agriculture than we can accommodate in our College Residence. We have fifty young ladies on the waiting list who cannot be accommodated at Macdonald Hall, and on Monday next we expect, from the applications that have been received, to welcome five hundred matured farmers at the college for the course of two weeks in Stock Judging and Seed Judging, and Poultry Husbandry for four weeks, and the course in dairying of three months.

Last year through these courses we had 1,275 students, so that you see it is no small problem that we have to work out for you at your College in the city of Guelph. —the agricultural education of the farmer and the farmer's son and daughter.

I am going to say some things to-night along the line of co-operation in agricultural educational affairs. There has been co-operation for all time in this world more or less, I suppose. There was co-operation even in the garden of Eden when Adam and Eve decided to build up the human family. There has been co-operation in dairying in this country when the two R's, Robinson and Ruddick, accepted the Dairying Commissionership, and the two P's, Putnam and Publow, in carrying on dairy educational work, and the two D's, Dargavel and Derbyshire, in managing the affairs of this institution. (Applause.)

There are three or four elements that enter into this matter of co-operation that I am going to discuss with you to-night. Farming is the greatest business in the world, but the farmers themselves do not always believe it. They come to me in large numbers during the month of June to the extent of thirty or forty thousand. Every day we have a large excursion from as far east as Belleville and as far west as Windsor and from the north and south. They come to look over our Experimental Farm and get inspiration for their work, and they say to me, " Our business is not in it with the professions." And I will say, "Why?" Some of them will say, " I have a son-in-law or a son who is in medicine or teaching school and who is making more money than I am," and I often have to straighten up a man like that.

The farmer who is well to do and who gets three square meals a day and a month or six weeks holiday each year; farmers who are paying their honest debts, and if they have in their possession a piece of real estate valued anywhere from $5,000 to $20,000 when they are forty or fifty years of age,—I do not think it is for that man to decry his calling. (Applause.) Nor ought he envy the man in the city a single thing, unless it be a few things he could also have on the farm if he desired.

I want to say to you in all kindness that the man in the city or town who is paying out his entire income in order to live is not doing nearly as well as the farmer who is able to save a little each year. And while there are thousands of farmers who will give up their farms at the present time for a job worth $600 or $700 a year; and it will take all of that to barely keep him. The farmer does not consider the cash he has left over on the farm at the end of each year is clear profit, and he has had his living off the farm as well, while the man in the city has to spend his entire income in order to live, and has nothing left at the end of the year. There are not many men who get even a thousand or twelve hundred a year. In cities like Ottawa and Montreal and Toronto, there are thousands of men who are living on less or existing on less, who would be a great deal better off if they were living on a farm, and their boys and girls would be a thousand times better off if they were back in the country where they could make just as good a living as it is possible to make. (Applause.)

I think the reason why more of us are not making greater progress on our farms, and are not more contented with our positions, is a lack of breadth in education and a lack of breadth of intellect. We live monotonously on our farms. We do not know very many people outside our friends and neighbors. Very often we do not know the people on the next concession unless some of our friends are married to somebody over there. In the cities men make a larger acquaintance, and as they rub up against each other and see many men that are not as well off as themselves, they appreciate their position all the more.

I am going to say one or two things that will help to brighten our view and give us more money to allow us to travel and see some of the things that we do not have an opportunity of seeing. We spend too much time on our farms doing things in the old way when there are new methods and new conditions which we have not yet put into adoption. I will illustrate that: The average crop in the province of Ontario is not more than from one-third to one-half the possible return. Some farmers are getting forty bushels of wheat to the acre, but the average crop is only twenty-two. It is the same in oats, peas, barley, rye, roots, milk or anything you will. We find that the average man is not getting more than one-half what he might if he followed methods that are already known. I could not have said this to you a few years ago. It would have been cheeky for me to have come then and told you this, but we have at the Agricultural College and at the Experimental Farm at Ottawa conducted careful experiments as to the best varieties for particular sections of the country, the best kind of dairy cow, what she ought to do, and the kind of care you ought to take of her, how you ought to arrange her stable so as to get the very best results; and these things ought to be adopted at once by the farmers of the Province, because men in other lines of business adopt improvements as soon as they are found to be profitable. The merchant or manufacturer does not wait very long before adopting new methods and new machinery, because he is after the big profits. I notice in the papers that at least one quarter of our cows are unprofitable—25 per cent of all the cows in Ontario are unprofitable; that means that a lot of these old cows in the herd are not paying their board and they are eating up some of the profits of the other cows that are working hard and giving plenty of milk.

We used to talk of Oxford and Middlesex as the great dairying districts, but now we have to come down to Leeds and Hastings and Prince Edward County and wherever you have good dairymen, the farms are more valuable and you all know that the farms increased in value in these counties as soon as you adopted dairy farming. I had an experience in Western Ontario only a few months ago. A man came out on the road and stopped me and said he was trying to sell his farm and he offered me seventy-five acres of light land which used to produce good crops. It had a good house papered upstairs as well as down, a good barn 40 x 60 and an orchard of two or three acres. He said he was not able to make a living and was working out as a hired man with one horse, and he said he would sell that place to me for $650, and there was fifty acres across the road sold the same week for $500, with a great big house on it that was at one time used for a tavern. It was light land that had been allowed to go down and he was offering it for sale for $1,200. These things ought not to be and yet I feel it my duty to tell you some of these things that discourage us sometimes in our work.

You have been reading about drainage a little and it will pay you to put in tile drains because you can raise 100 per cent. better crops on land that is properly drained and you ought to be willing to spend $20 in draining when you are told that you will get back all you spend in the first or second year in increased production.

I might tell you just here what the Farmers' Institutes, the Dairymen's Associations, the Fruit Growers and the Bee-keepers, and one hundred and one different organizations in the Department of Agriculture are attempting. They are doing what they can for the development of affairs in this province, and if the men on the farm will take what is given to them and not distrust the information that is supplied them by such men as Messrs. Zavitz, Grisdale, Ruddick, and Publow; if you will take these things that they give you and put them into practice for the benefit of yourselves they will justify our retaining our positions at the Agricultural College, or the instructors retaining their positions as they go from cheese factory to cheese factory. They are not there for the purpose of coercing you into things that you do not want to do. These men are big men, and if they just held up their hands the men in the United States would take them at increased salaries.

Now, what are we doing for the farmer's boy? We are doing a work for the grown boy who has had farming experience and then comes to us to learn better methods, but we are not doing very much for very many of them because we have only 1,275 boys and girls from the province of Ontario at the College, and we have two million and a half of population. And there are thousands and thousands of boys and girls at the High School, who get no further education and no education in agriculture. We have a school in operation on the grounds of the Agricultural College known as the Consolidated Rural School, where a boy in the country can get just as good an education as he can in the city.

Two years ago a boy of mine, then fourteen years of age, came to me at that school and said to me, " Father, I have earned five dollars to-day." I said, " My boy, I am glad of it, where did you get it?" And he said, " At the fair, a prize." I asked him how he had got it, and he said that they had a nature study competition for the boys from the rural schools from the county of Wellington, and that he was selected by his teacher, and with forty-three boys from other schools. They had to answer certain questions about farming matters. I said, " What do you know about farming?" and he said, "I don't think I know very much about farming, but I know the questions that were asked me, and I got the first prize." I asked him what he had to do, and he said, " The judges came out and placed a dozen or two apples on the table and pinned a number on each and we had to name the different varieties." I asked him if he could do that, and he said, " Certainly." Then I asked him where he learned the different kinds of apples, and he said, " We bring the apples to the school, and we exchange them with one another, and the teacher will not let us exchange apples unless we know the name, and we are as familiar with them as ABC. You can't fool me. I know the difference between a Snow and a McIntosh." I asked him what else he had to do, and he said, " We have to name the different weeds of the province, and tell whether they were annuals or biennials, or whether you can kill them by plowing them under or whether you had to dig them up. We had to name all the common insects and divide them into classes, those that suck the juice from the inside of the tree or from the flower or leaf, and those that eat with their mouths." I said, " What difference does that make?" He said, " What is the good of putting something on a tree, like Paris green, for an insect to eat when it does not eat, and if he sucks it, you cannot kill that insect with

Paris green." Then he went on to tell about the other parts. And that boy was getting that kind of an education in addition to the ordinary subjects they learned at school, and it would be better if every business man and every preacher, if you like, had a knowledge of these things. When I was at school I was compelled, and it took a good deal of compulsion, to learn certain things by rote, and if I did not I had to stay in after four; and as I did not like to stay in, I learned a good many things by rote. I learned that conjunctive pronouns are those that connect clauses to other words in the sentence, and the noun or pronoun to which the conjunctive refers and joins its clause is called its antecedent.

I could sit in the back seat and string all this stuff off. When the new teacher came on the first of January, as they generally did, I would go over all these things again, and I had no desire to be promoted to a higher class so that I would have to study something else. And too much of that sort of thing is going on in our public schools to-day, with all due deference to our splendid system of education, and we have a splendid system that has been well thought out. And we have people coming from all over the world to our Agricultural College. We have boys there now from twenty-two different countries, and in this perfect system of education that is admired so much. But I want to stop just for one moment and ask yourselves the question: Why should not all the boys and girls in our schools get the same sort of training I have been telling you about that my boy got at the Consolidated School at Guelph? Do you still get the teacher whom you can get the cheapest? I am afraid that you often do. I am afraid that just as soon as the teacher gets a name in the community for thorough and practical work, he is bought off by the next community for an increase of $50 or $75, and it only means a difference of 50c. apiece, and for that extra price you could have retained the teacher who you said gave your boy or girl such a great start in life. When they came home it was a pleasure for them to get out their books and go to work. I would like to see the boys come to our College better trained. I do not like to see boys come to us who have been on a good farm and yet are ignorant of these things that would be useful to them. There is no infectious disease that will make its appearance but the doctors know it next morning by telegraph; but the weeds can get all over our farms from Cornwall to Windsor before we realize the danger, because we have not received the necessary training to enable us to detect them when they appear.

I want to tell you of a new method that is being adopted. The brightest and best teachers who are going to teach in rural schools are excused from the Normal School at Easter and sent to us for the last three months for a sort of top-dressing in this agricultural work, and we give them a special training. The great bulk of our school teachers are now young women, and they take readily to this interesting study of insects and plant life, and they are able to teach it to the boys and girls in the rural schools. But you are not going to be able to get these teachers for three hundred a year. They are not going to equip themselves and come back to the rural municipalities for anything like such a salary, and if it is not worth while to pay the necessary couple of hundred dollars more to get the best teacher, then you have no complaint if the cities and towns get the better teachers and have better schools.

I want to say a word about the girl, the farmer's daughter who comes to us for a three months' course. They often say to me after they get through, "Mr. Creelman, if you had told my father and mother that I should receive anything like the training I have received, before I came here they would not have believed it." They not only learn cooking and sewing and laundry work, but they learn how to do home work systematically, and they go home and are able to do the family washing, and do it quicker. They learn to save time over and over again, and they get a new dignity in home work and they are able to be what a woman should be, an adornment to the home. (Applause.) Do not say this is for the rich man's son and for the rich man's daughter; it is for everybody. The teachers who are trained at Guelph can be secured at your school if you are willing to pay the little difference that it will cost, and if the farmers will only believe that this work is for their children, for the boy on the farm, and the girl on the farm, and if they will just believe that they have just as much right to ask for this education as the man in the city or the man in the town, then this great work will spread from one end of the Province of Ontario to the other. (Applause.)

IS THE CANADIAN CHEESE TRADE IN DANGER ?

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

[This address will be found under a similar heading in the report of the proceedings of the Dairymen's Association of Western Ontario.]

The Chairman: I am sure you will all be pleased to hear the next address we are to have is from the Hon. James S. Duff, Minister of Agriculture for the Province of Ontario. When I first became engaged with the Dairymen's Association we had as Minister of Agriculture the Hon. John Dryden, under the administration of Mr. Hardy, and I have always said, although a political opponent of the Hon. Mr. Dryden, that he was one of the men that had done much for agriculture and for the dairymen of this Province. He was a very capable man, indeed; and when the change of administration came I confess that I felt some discouragement on that point. I felt that perhaps the Hon. Mr. Whitney would not be able to fill that particular position in the Cabinet, that nobody would fill it with the same ability, that Mr. Dryden had; but, when I came to know the Hon. Mr. Monteith, I felt very much relieved. Mr. Monteith in his term did much for the dairymen in this province, and although coming from the western part of Ontario where dairying is not carried on to the extent it is with us, still he seemed to know and appreciate our wants, and did everything in his power for us. I have always felt grateful to Mr. Monteith for what he did for dairying in Ontario. When the time came when Mr. Monteith stepped down and out, and the position was filled by the present Minister, Mr. Duff, I did not have the same apprehension that I had before; because I had become acquainted with Mr. Duff and I knew he was eminently a practical man, and I knew that he was an enthusiast in the cause of agriculture. I knew that he was a genial man, and a man who would do everything in his power for the dairymen of this country, and I have not been disappointed. (Applause.)

I have had occasion to go to Hon. Mr. Duff a number of times looking for some grant or some legislation that I thought would be beneficial to our Association and to the interests of this country, and on every occasion I ever approached him he would give me a careful hearing, and if possible grant my request. I always thought when he did refuse me that he felt worse over it than I did, and I have always been very grateful to Mr. Duff for what he has done so far. I am extremely thankful that he is with us to-night to speak to us for a short time, and that you dairymen and agriculturists of this section of the country will have an opportunity of seeing a practical every-day farmer who is devoting his energies to the cause of dairying and to the cause of agriculture generally. I have now much pleasure in introducing to you the Hon. James S. Duff, Minister of Agriculture for the Province of Ontario.

ADDRESS.

By Hon. J. S. Duff, Toronto.

When the speaker arose to address the audience Miss Marjorie Kerr presented him with a beautiful bouquet of roses. He said: I scarcely know what to say to you after the very kind words that have been said of me by your Chairman, and then after the presentation by that beautiful little girl of this splendid bouquet of flowers, which I shall try to take home in a good state of preservation, and after the magnificent reception which you as an audience have seen fit to give me on this my first appearance before the Eastern Dairymen's Association. I have been wondering what I ought to say at this hour of the evening. The hour is pretty well advanced; you have heard two splendid addresses from Mr. Creelman and Mr. Ruddick, and I promise you that my speech will not be quite along the same lines. First, I desire to congratulate the dairymen of the Eastern Ontario Association on the magnificent turnout you have here to-night, and what is most pleasing is the fact that this audience is not an audience altogether of dairymen, and their wives, sons and daughters. I can quite understand it all after going through the streets, and seeing one of your beautiful stores arrayed with a cow and the milk-maid, the churn, the butter-dish, the ladle and all the paraphernalia ready for the work in honor of the meeting of the Dairymen's Association. I can quite well understand that the citizens of this beautiful city are alive to the importance of this gathering, and are welcoming you with open arms. (Applause.)

The thought came to me when President Creelman was speaking that you can go up and down the cities of this fair province—and there is no province in Canada nor yet is there any State in the American Union that has more beautiful cities and towns than the Province of Ontario—but you can go up and down in these cities and towns, you can live in them weeks at a time and watch the movements of the people from seven o'clock in the morning until six at night, and you will find there is more hard work and more workingmen in the cities and towns in the province than on the farms of Ontario. The farmers do not believe that; but if you watch the life of the farmer, he may get up early in the morning and toil all days till late in the evening; but perhaps the next day he quits his work and goes off for a drive somewhere and the next day he is into his work again. He has a variety of work; there is no monotonous work. Take the profession of law; only a few lawyers make a great deal of money. Everybody knows that there are a great many of them do not make very much (Applause.) Take the doctors, or the merchants, and take all classes of men in business life in Canada who live in our cities and towns, and how few there are of those who have made a success of life. Their brows are wrinkled with furrows from the care, the worry, and the time they have put in burning the midnight oil in order to obtain that competence which we are glad to see them have. When you contrast them with the farmers in the present day, there is no place to my mind where there is the same average wealth and health that there is on the farms of the Province of Ontario. Years ago if a farmer had a bright boy, he made a lawyer or a parson of him, and the fellow that was a little duller, he was kept at the plow; but to-day the farmer does not look at matters in that way. There is no place in Canada where they require more brains, more thought, and more honest effort than on the farm, and from this time forth instead of a farmer sending his boy who is a little clever, to make a parson of him, he will make a farmer of that chap and make a lawyer of the duller boy.

I have one thought with reference to that splendid address given by Mr. Ruddick, and that is that when you have listened to that address carefully all the way through, you are bound to come to the conclusion that this is becoming a great country, and that the cities and towns of Ontario and Canada are becoming large. It never dawned on my mind that we have such a great population in the cities and towns of Canada until about a few days ago I was at a conference at which the Mayor of the city of Winnipeg was present, and he made the astounding statement that, possibly more than one-third of the population of the great prairie province of Manitoba lived within the confines of the city of Winnipeg. That means that one-third of the population of the province of Manitoba are non-producers as far as the soil is concerned. It means that one-third of the population of Manitoba have to buy provisions for themselves from the other two-thirds who take care of the soil, and I am sure the same thing is true of the Province of Ontario. We are quite safe in saying that we have 2,500,000 people in this province, and if you take the city of Toronto, and all the cities and towns west of Toronto up to Lake Huron and Lake St. Clair, I venture to say that there is a million of people in the cities and towns including Toronto and those west of it; and that means a very growing home market. I know you won't accuse me of speaking politically when I tell you that in the old days of the National Policy when I talked politics I never forgot to look forward to the day when we would have an enormous home market, and that is conceded now by everybody; and all you have to do is to look at some of the smaller things you yield. Take, for instance, eggs. When the McKinley tariff was put on and our eggs were shoved out of the American markets they were almost a drug, and our people commenced to look for another market and they shipped to the Old Country. But during the last few years the farmers have been receiving splendid prices for eggs; yet, strange to say, just as Mr. Ruddick told you of the cheese and butter products, our exports are falling off. We are annually shipping comparatively small quantities of eggs to the Old Country, compared to what we did a few years ago, and yet the price is higher than ever, because of the enormous home market that we have.

I might say a word or two to-night to the great bulk of you ladies and gentlemen who are not like Mr. Dargavel and Senator Derbyshire, and myself, travelling around the country from pillar to post, and perhaps doing very little at home. You are busy men and women, and you have not an opportunity of knocking around as we have, and it occurred to me that I might say a word or two of our own province to-night. I sometimes think that we do not take the pride in our province that we should. I sometimes think that we have people in Canada that do not take that pride in their country that they should. I am satisfied I am fairly right when I say I am looking into the faces of people the greater percentage of whom are the descendants of the United Empire Loyalists—descendants of the men and women who rather than give up their love of the flag of old England, that grand old banner that has braved a thousand years the battle and the breeze,—rather than give up their adherence to that flag that they love, gave up all that they had as far as earthly possessions were concerned and wended their way from the republic to the south of us as best they could into the wilds of Canada and hewed out homes for themselves in order that they might be beneath the folds of the flag they loved. There are other portions of this province in the same position. Go up into the county of Lincoln and the great portions of that territory around Niagara Falls were settled by United Empire Loyalists; the same in Simcoe; a great portion of the early settlers were Englishmen, Irishmen and Scotchmen, so that the province of Ontario was settled in the first instance by the most honorable band of men and women that ever pioneered on this grand earth. (Great applause.) They were noble in character. Those pioneers of 60 or 75 years ago would not be guilty of marking the cheese a little higher than the proper weight. One neighbor would not do another in a deal. They prided themselves in their honour and honesty of dealings, and they left us a heritage that we ought to feel a great deal prouder of than we do. That splendid heritage brings us a greater responsibility; the greater our privileges the greater our responsibilities. It often occurs to me that in this young country of ours we sometimes forget the splendid place that we occupy, and we fail to come up to the responsibility which it involves. I was reading the other day of the great consignments of apples that went from this country to the Old Country during the past year, and I read how many of them had not arrived in good condition and were not properly packed, and I read how apple packers were fined in different parts because they did not come up to the Fruit Marks Act.

It means one or two things, either that the buyers are acting dishonestly and not doing their duty to the people, or else it means that the people who have the orchards knew what was going on, and in order to get a little more money allowed that sort of thing to be done. If there is one thing more than another that we as farmers and business men should do it is to inculcate honesty in our business dealings. (Applause.) I remember one time when at school, a line in our copy-book, "Honesty is the Best Policy." There is nothing as sure as the fact that nations are just as individuals. If the individual people of this country are honest, the nation will be honest, and it will be known all over the world that it is honest. Our trade to-day is in every land and under the suns of every clime, and we should endeavour to instil in the minds of the peole that all our dealings should be fair and honest.

I said we have a great province. Have you ever thought of its resources? I believe that if it were properly farmed and properly handled, this old Province of Ontario, to say nothing of the great virgin country to the north, will hold twice as many people as we have on the land to-day. I find that in every section in the Province of Ontario where the people have engaged in dairying or cattle growing, where they have developed the grain and live-stock, or butter and cheese year by year, it is becoming richer, and year by year the farmer is getting better crops, showing most conclusively that all we require to do is to take proper care of the land and if you do, I believe the land would be better to-day than when the virgin forest was taken off. (Applause.) So that in that respect we have a great mission to perform looking to the future of the agricultural industry of this province. Every dollar's worth of cheese, butter and live-stock means that the food is consumed upon the farm, and has not been sold as it came from the threshing machine, and consequently that farm has not been drained one iota.

One of the things that will strike you in going through the province of Ontario is the great variety of land that we have. If you get on the train at

Windsor and go through to Ottawa you can scarcely believe the different varieties and types of country you will travel through in that distance. In Eastern Ontario you are better adapted for dairying than perhaps any other class of farming. Go up into the country west into the section of country to which I belong, and you will find that grain-growing can be followed with a considerable amount of profit; and then if you go down along the shores of Lake Huron you will get into the fruit belt, and we have a great number of fruit belts in Ontario—the fruit belt along Lake Huron, and the fruit belt in the County of Essex, and the fruit belt towards the Eastern end of Lake Erie and the Niagara River and the Western end of Lake Ontario. In twenty-five years from now there will scarcely be a farm in the Niagara Peninsula that will not be growing fruit altogether, and they will abandon all other kinds of farming operations.

If you take the trolley at Hamilton and go to Beamsville, twenty-five miles, and where years ago they had farms with houses and barns—one hundred and two hundred acre farms—to-day there is scarcely one of these farms left, and it seems to be a continuation of villages, ten-acre farms, five-acre farms, twenty-acre fruit farms. To show you how this is developing I want to tell you something that happened with reference to peaches this year. We had the greatest peach crop that we ever had in the province, and yet peaches were not very cheap. It is only four years ago that two car-loads of fruit were sent to Winnipeg to open up the market in the West, and during this last season over five hundred cars of fruit were shipped out of the Niagara district alone to Winnipeg.

After our Deputy Minister, Mr. James, came home from England this summer, just about the time of the Toronto Exhibition, he said to me, "Mr. Duff, if we could only put our peaches on the English market!" and I said to him, "Why can't we?" And he said, "We have never yet been able to ship them and land them in England in good condition." We talked the matter over for a short time, and then I asked Mr. Hodgetts, the head of our Fruit Branch, to come down and talk the matter over with us. I finally said to him, "Get a bunch of boxes, have the peaches properly packed, and send them to London, supposing they are all rotten when they get there." And he did so, and they arrived in splendid condition, and some of these peaches were sold as high as twenty cents and twenty-five cents apiece. What does that mean? It means helping out the people in the other sections of the province, because they will have to grow the stuff that will be taken up by the peach orchards. It will not only make us more popular, but it will make farming work more interesting from every point of view.

I have only spoken of Old Ontario. What about the North? A few years ago people thought that when they had gone a little north of the town of Barrie or up into the Parry Sound district that they were at Land's End. What do we find? The T. & N. O. line from North Bay to Cochrane, which is the junction of the Grand Trunk Pacific, is a distance of about two hundred and seventy miles. After you pass Cobalt, where we have the greatest silver camp in the world, north of that we have the region that contains minerals in abundance, and as years roll on millions of acres of undeveloped mineral land will be developed, and that will help the people of Old Ontario and of New Ontario to carry on their agriculture. After you leave Cobalt and go a little farther north from there for nearly one-hundred-and-seventy miles, we have almost a continuous belt of beautiful clay land. (Applause.) No man in Old Ontario ever saw more beautiful land than there is in the townsite of Cochrane (applause), and when we are there we are still twenty-five miles south of the city of Winnipeg. What does it mean? It means that in the course of time we will have more people north of what is known as the rock region than there is in the Province of Ontario at the present time. We have in the clay belt twelve or sixteen million acres of beautiful clay land. (Applause.) It means that we have in that clay belt, as much land as we have in Old Ontario in the district from Toronto to Midland and west, and along the shore of Lake Huron. Draw a line from Toronto to Midland, and then travel from there west around Lake Erie, and we have as much land north of the rock region as we have in all that territory. The fever is dying as far as the west is concerned. You will be surprised when I tell you that our director of colonization this fall had several letters from people who have gone to Saskatchewan and Alberta, who wish to get homes in Northern Ontario, and they have been asking for maps and information. They are thinking of pulling out from the West and settling in Northern Ontario, and all we want to do is to move along the way we are going. We do not want to make mere splurges, but we want a place for our sons and daughters to settle in, and I have no doubt that instead of going to Alberta, Saskatchewan, and Manitoba they will be going to Northern Ontario to make homes for themselves in that great country.

I think it would be unfair for me to occupy your time any longer. I came down here just to express the pleasure of being with you in answer to the invitation of the Eastern Dairymen's Association, and to show my sympathy with the work in which you are engaged; and so far as I am concerned, and as far as the Government is concerned, you can depend upon it, that in every way possible we will be prepared, as the Government has been in the past, to aid the industry which you represent to-night, and every other industry which goes to the building up of this great and splendid Province of Ontario. (Loud applause.)

The Chairman: I have a very pleasant duty to perform. There are a couple of presentations to be made to-night, and I will explain how it comes about that they are to be made. Last winter the managing director of *Farm and Dairy,* the paper which is the organ of our Association, instituted a competition for the best farmers in Eastern Ontario, and in order to carry out the scheme solicited subscriptions from some of our liberal men who came forward and helped along this scheme. I am glad to say that two of these prizes have been won by directors of the Eastern Dairymen's Association after a very strong competition. Judging was done on points. A thousand points was given as the maximum number, divided in the following way: The house on the farm was allowed 150, place 150, live stock 200, crops 200, management 150, machinery 75, implements 75. The judges visited the place twice, once in the summer time and once in the winter time. The success of this movement was largely due to the perseverance of Mr. Cowan, the editor of our paper; and when he sets about anything he is sure to make it successful, and also through the liberality of friends of the dairymen. Among these I might mention Professor Robertson, who is known to all of you, and another gentleman who has been a firm and consistent friend of this institution for many years. I have been connected with it for seventeen years, and I have never attended a meeting of the Eastern Dairyman's Association without meeting my friend, Mr. Henderson, who is manager of the Windsor Salt Works. (Applause.) He has always been with us, and he has always helped us some way or other. He has furnished the badges we are wearing here for years, and he has never allowed us to mention it, and I am afraid my neck will be in danger for saying what I have. But I cannot refrain from giving credit where credit is due. The farms in Eastern Ontario were judged by Mr. Ness, a well-known breeder of stock in Quebec. The judging was thoroughly unbiassed. I am very glad that we have among our directors men who are able to secure these prizes. The second prize was won by Mr. James Anderson, the next was won by Mr. Alexander Hume, of Menie. (Applause.) I shall call upon Mr. Henderson to present one of these prizes, and in the absence of Professor Robertson, I shall call upon Senator Derbyshire to present the other.

Mr. Henderson: It is quite true that I have been coming here for seventeen years, but had I known the President was going to say the things about me that he has, I should not have been here. It is not very often that I appear on the platform; in fact, it is very hard to get me there, but when I heard from Mr. Cowan the object for which I was asked to come upon the platform, it gives me a great deal of pleasure indeed. Although I am not directly connected with the farm, I have taken a personal interest in farming.

I might talk to you about the greatness of Canada. It is a great country. I might talk to you about the mines in Canada, and I might talk about the great bodies of water, teeming with fish, or I might talk about the great forests that we have in Canada; but, after all, what is the greatest thing in Canada? What does it depend upon? Farms. It is not the mines or the fisheries or the forests, but it is farming. (Applause.)

We all depend on it and rightly so. Canada, to my mind, is going to be a great farming country in the future. Sometimes we forget that, and we think that the great aim and object of life is to get into a city and earn money. But, after all, can it in any way compare with the life of a farmer, especially a dairy farmer? I do not think anybody here will say that, vast and great as this industry in Canada is, that it is anything like what it might be. If you go over to England you will find Canadian cheese there, but you will also find cheese that is made in England that commands three pence or four pence a pound more than cheese that comes from Canada. If we took the care in manufacturing cheese that we ought to, and if we took the care of our farms that we ought to, we would secure the same price for our cheese as the Englishman does for his. We heard last night of the cow that was earning $16 per year as against a cow that was earning $77. If we are going to make Canada great we have got to turn out the best that can be turned out, and if attention is given to farming that ought to be given, in a few years, anything that comes from Canada will be known as the best the world can turn out.

I have been in this country a great many years, and I have been over the whole of it. When I first came out, I was simply horror-stricken when I saw the snake-fences and the weeds growing up, the untidy buildings and dirty barns. Possibly there was some excuse for it in those days, but there is no excuse for it now. Some years ago I spoke to the late Mr. Dryden about this very matter, of encouraging farm improvement by prizes. He said: "Mr. Henderson, it is a great undertaking; nothing of that kind could be done." I said: "I think possibly it can be done in sections." He replied: "It is too large an undertaking." However, I am glad to know that Mr. Cowan had the energy to initiate a movement of this kind, for I do not know of anything that will tend to improve the state of our farms more than a competition of this kind. I am very glad indeed to know that a friend of mine, coming from Prince Edward County, has won second prize. After all is said and done, it is something to think that, over the whole length and breadth of this Province, he has been able to put his farm and buildings in such a state that, in competition with all others, he has won second prize. (Applause.) It is something to be proud of. It means something to the whole country at large. These farms that won these prizes will be an object lesson for other farmers in the neighborhood. They will want to go and see how it was that Mr. Anderson was able to win a prize of this kind, and they will try to improve their farms and come up to his. It affords me very great pleasure indeed, Mr. Anderson, to hand you this prize (great applause), and I hope your children in years to come will recognize the fact that their father, in competition with the whole of Ontario, was able to win such a prize as this.

Mr. Anderson: I can assure you that it is a pleasure and a pride to have a silver tea set of this kind from a gentleman like Mr. Henderson. No farmer that I ever talked with has given me better information than our good friend, Mr. Henderson. It is not always that you get the best points from a farmer. You can get good help from such men as Mr. Henderson. I would like to say that while I have won second place in this dairy competition, there is not a dairyman in Eastern Ontario who cannot do better than I have done. The easiest way to make money on a dairy farm is to take a cow that is earning $25 and make her earn $70 or $75. These things I have done, and I know others who have done better still. I was brought up in a way that when I undertook to do anything it was necessary to keep the best of company in order to do it, and I say here to the dairy farmers of Eastern Ontario that you cannot be in better company than you are at a meeting of this kind. (Applause.) I thank you, Mr. Chairman, for this magnificent present.

Senator Derbyshire: I am sure we are delighted that these prizes have been given to two of our directors. We are delighted that they have taken such a high position. There is nothing too good for the farmer; do not make any mistake about it. It is the farmer that ought to have the good places, and we are delighted that they have such beautiful homes in Ontario. I am proud to know, Mr. Hume, that you have a herd in such beautiful condition, and that you have sent such a large quantity of first-class milk to the factory, and that you have come in third in connection with this prize competition. I find that the man that got the first prize only had 830 marks, and he got some large marks on account of his beautiful home, and on account of his lawn. Friend Anderson had 821 points, and you have 805, and we find that you lead them in connection with your dairy herd, and I am prouder of that than anything else in connection with this business. I want to say to you that there is nothing in connection with the Province of Ontario that shows up like the prosperity of the dairy business of our country. We have sold our cheese at a higher price, and we have the cows that will produce the milk that will make a fine quality of cheese, and we want to make a better quality of cheese and increase the home consumption. When we had high flavored butter the father and mother would set a good example to the children and eat a small quantity of it, and the beloved children could not eat the butter at all; and the butter remained on the table festering from day to day without any consumption going on. But with the fine quality of butter we are now making they are using more of it all the time, and the children are eating ten times as much of this butter as they did before, and we are sending carloads of butter to Winnipeg, Vancouver and Victoria. Keep your dairy herd up, my brother, and raise the standard from year to year; increase the facilities in connection with your own farm! I love to see the farmers come into the town of Brockville with their clean buggies and nice horses and drive past those people who live in the cities and starve to death. I say to you farmers go on, build up the country and build up this great Province of Ontario. We are the great pivot of federation; four Provinces to the East and four Provinces to the West. We have two millions more money in the bank this year than we ever had in the history of the country. (Applause.) I have very great pleasure in presenting this prize to you, and I am delighted that our friend, Mr. Henderson, contributed $200 to help this cause on. When you take that home to your beloved wife, smile on her, and make her cheerful. (Applause.)

MR. HUME: This is one of the pleasures of farming, and I know of what I speak. There is no other occupation that you can take the same pride in that you can in farming; watching the growing crops and the animals in your herd; watching all these things grow up controlled by yourself. There is a great deal more pride in that than there is in handing goods over a counter. I have a near relative a merchant, and another a doctor, and another a principal of a high school, and I would not change positions with anyone of them. I feel satisfied we have the best occupation. We farmers look down upon ourselves and we are now beginning to realize the position that we occupy. (Applause.)

PRESENTATION TO JOHN R. DARGAVEL, M.P.P.

SENATOR DERBYSHIRE: We have had the real pleasure the last two years of having our friend, Mr. Dargavel, as our President. He did the work so nobly and well that we have been delighted with the service he has given us, not only as chairman of our meeting, but in presiding over our Board and helping to promote the dairy interest of our country. While he has been connected with this Association for seventeen years, every position we have asked him to fill he has done it with great acceptance to us and great advantage to the Province. For the last two years he has filled the position of President of this Association, and having a seat on the floor of the Legislature, he has been able to bring the matters before the Minister of Agriculture with prominence, and we have been able to do great things for our business. When I was president I tried to lift the tax of $15 on our cheese factories We used to get a small grant of $4,000, and we had to raise $12,000 ourselves to carry on the work of dairy education when there was no reason why it should not be free, the same as any other education. We elected Mr. Dargavel President of the Association and we got him on the floor of the House, and now dairy education is free in the Province of Ontario through efforts that he has put forward. He has retired from the position of president, and we have elected him honorary president; every man in the room voting for it, and we are going to have his influence and co-operation in the future the same as we have in the past.

On behalf of the Eastern Dairymen's Association and the dairymen of Ontario, I have very great pleasure in presenting this gold-headed ebony cane and this beautiful brass inkstand, paper knife, blotting pad, clock, and other articles. We love you on account of the dignity of your person, and on account of your simplicity and the pureness of your life, and on account of your eloquence, and the great service that you performed in advancing the dairy interest of Eastern Ontario. (Great applause.)

MR. JOHN R. DARGAVEL: I wish I was possessed of that eloquence that you have just spoken of. I would like to have it at the present time to say to my friends how thankful I am, and how proud I am of the presentation that has been made. This is totally unexpected, and is a great surprise. I was not looking for anything of the kind, and I am not deserving of anything of the kind. Really, I do not know what to say. Even if I were possessed of some kind of eloquence it would surely fail me at the present time. It is the second time within a few weeks that I have been put in somewhat the same position. At the election of directors in my own county a short time ago I declined to be re-elected, and an altogether too fine and altogether too flattering resolution was passed at the meeting, and I was totally unable to reply. It was just as much a surprise at that time as this presentation is now.

Whatever I may have done for the dairymen and the dairy interest in this Province, I have done with pleasure. It is not nearly as much as I would have wished to have accomplished, and when I was urged to act as director and president of this Association some time ago they were kind enough to say that I would be useful to the Association on account of my connection with the Legislature. I replied to them, and I say now, that no matter whether I occupy any position in connection with the Association, that I will do willingly and cheerfully anything I can and to the best of my ability on the floor of the House for the dairymen. So long as I can find a dollar to pay my annual membership I intend to remain a member of the Association. I really cannot find words to express my gratitude to my friends. I have been connected with the Board for some seventeen years, and I have never met with anything but the most extreme kindness from the members of the Board and from the members of the Association. My connection with the Board has been of the pleasantest. In all that time there has not been the slightest friction. There had been a little previous to that time, but since then, I am glad to say, everything has been very smooth sailing, and I have never known a member of the Board who was not trying to do all he could for the interest of the Association. Many of you people do not know the influence that is exercised by the Dairymen's Association, and I can say this without being egotistical, from the fact that I am, to a certain extent, severing my connection. From the time I have been connected with the Board it has grown up from a small plant to a large and luxuriant one.

We have had every assistance from the Governments, both of Ottawa and Toronto, our connection with both these Governments have been of the pleasantest kind. They always seem anxious to help the work that we have in hand, and I think that our Association has been of assistance to them. I shall treasure, Mr. Senator, ladies and gentlemen, these mementos as long as I live, and shall leave them to my family. It will be with pride that I can point to them in the years that are to come and say that my efforts, however poor they have been, were appreciated. It will be an incentive, I am sure, to my children and, perhaps, to my children's children, to do what little they may to advance the cause of this great Province of Ontario. I thank you, gentlemen, for your kind remembrance. (Applause.)

ROUGH FORAGE FOR DAIRY CATTLE—HOW AND WHAT TO GROW AND HOW TO USE IT.

By J. H. Grisdale, Ottawa.

Our keenest rivals in dairying are Holland and Denmark. These two small corners of Europe are blessed with soil and climatic conditions no better than maintain in Eastern Ontario. When it comes to buying feeds the Dane and Dutchman must come to us, pay our prices and then transport 4,000 or 5,000 miles. We Canadians are usually satisfied with 20 to 25 cattle to the 100 acres. The Danish and Dutch farmers want from 75 to 100 head. They feed all these much better than we do our few. They grow all the roughage. We naturally ask how they do it.

The answer is simple. In the first place these men cultivate their farms. We usually make but a feeble pretence thereat. In the second place, they grow the right crops and grow them well. We grow similar crops but handle them badly. The crops these men can grow most advantageously we can produce in even greater abundance and with greater certainty. Besides we can grow cheaply, easily, a crop that never fails, corn.

We could grow clovers, grasses and all other forage crops as well as any Dane or Dutchman, but we don't. We should. Until we do we are not going to make the mark we might in milk production.

So much for crops. Of cultivation I may not speak. One would think we would all know enough to do that well. Well, we don't. We are sadly lacking.

Every Canadian farmer interested in dairying should, for patriotic reasons, if for none other, try to beat these Danes and Dutch at their own game. This would be one case at least where patriotism would pay dividend in dollars and cents. Let us consider the matter of producing better forage and more of it on our Eastern Ontario farms.

In the first place we must do our farm work better. Every extra hour's work spent upon the field pays high wages. This is true, of course, up to a certain point. I have never yet been able to determine just where that point was. It has always seemed to me that I might profitably have gone on a little longer. I believe the last extra hours are the most profitable hours spent on the field.

As probably the most important crop for the Eastern Ontario Dairyman stands pasture.

Pasture grass at the right stage and in abundance has no superior as a dairy ration. But at best it is expensive, while generally it is a ruinously extravagant method of feeding. However, we all use it more or less, and much may be said in its favor, so what we cannot stop, let us try to mend.

Leaving rough lands or permanent pastures aside, not one farmer in a hundred in my experience makes the least effort at special preparation for pasture. The results are quite up to the preparation, the cows starve and the farmers blame the weather.

Permanent pastures on arable land are not practicable, much less profitable. Hence a combination of meadow and pasture preparation seems really the thing. Good meadows and rich pastures are not spontaneous. Besides the good meadow does not necessarily lapse into the good pasture in a year or two.

A great variety of grasses might be used for either hay or pastures. I have noticed that the more complicated any plan offered for improvement the fewer farmers pay any attention to. I personally have the same disinclination to follow any scheme that looks complicated, and I don't do it if anything simpler can be devised. Let me give you my plan for securing a good meadow, and later a first-class pasture.

Prepare the land. Begin to prepare the land the year before seeding down. That is, manure and grow a hoed crop if possible. If a hoed crop is out of the question and manure is scarce, then plow from sod with a shallow furrow in late July or early August. Work well with roller, disc harrow and cultivator. Do not hesitate to work it often. Do not forget to work it well. Do not fail to work it at frequent intervals all autumn. Replow with a slightly deeper furrow, or better still, ridge up with double mould board plow in October after sod is well broken down or rotted. Leave this all winter.

Prepare for seeding by levelling with spring tooth, stiff tooth or disk harrow. Smooth-harrow and roll. Sow two bushels oats, one and a half bushels of barley or one and a quarter bushel wheat per acre. Sow grass and clover seed at the same time or the same day. If land is very dry harrow grass seed in with very light harrow and roll. If land is moderately dry roll only after seeding. If land is moderately moist neither roll nor harrow at the time of seeding, but leave till grain covers the ground, then roll in fairly dry time.

A most important consideration is not to forget to sow the grass and clover seed. Very few of us forget entirely. The great majority of us forget about half or more, and very many of us forget very nearly the whole thing. It costs quite a bit to remember in this case. I have a suspicion that is why we so frequently and so easily forget. Forgetting is really more expensive, if we would only stop to think or watch results.

The common grasses and clovers are the best to sow. Timothy brome grass, cock's foot or orchard grass, rye grass, mammoth clover, red western clover, alsike clover and alfalfa are all suitable. The soil, the field and the purpose in view should influence the choice. Thus, little use sowing cocks-foot on light soil; no use trying alfalfa on badly drained land, and mammoth clover is rather unsatisfactory for late summer and fall pasturing. For average conditions, timothy, red western and alsike clovers will give best results.

Sow enough seed. Sow twelve to twenty pounds timothy, three to five pounds alsike and eight to twelve pounds red clover per acre. If you hesitate about sowing so much, sow a little more. If your soil is fairly rich and well drained add a few pounds of alfalfa per acre, say five or six pounds. A couple of pounds of mammoth in place of as much of red clover might be advantageous. In heavy clay soil four or five pounds orchard grass would do good.

The average seed drill grass seeding attachment won't sow this much seed. Sow it by hand or by means of special grass seeder. Divide the grass seed mixture into two equal parts. Sow each part as to entirely cover the field. Sow the first half of the seed lengthwise, then sow the second half crosswise the field. The first half might be sown from the grass seed attachment on the grain drill, the second half by hand across the seeder rows.

The expense may seem prohibitive and does, I know, usually deter from this style of seeding. Such a seeding, leaving out the alfalfa, might cost from $2 to $3 an acre. The returns will be from ten to twenty dollars per acre better either in hay or pasture each year than from the average seeding. I have tried both ways for many years. I know. Try it. Then when you have the pasture use it wisely. Pasture down fairly well, but not close. Give it a chance either by having enough pasture for the whole herd, or divide the herd, or else divide their attention by giving the pasture a few days off now and again as needed.

So long as we continue to practice summer dairying almost exclusively as we do at present in Eastern Ontario, methods of summer feeding must be more important than methods of winter feeding. Good pastures are of value, but even the very best of pastures run short in times of drought. Then how shall we supplement? First and best by the summer silo. Cows always welcome good ensilage; or, next best, by various soiling crops.

The summer silo means corn for ensilage. Corn for forage is easily the most dependable, the most profitable and the most economical forage crop in Eastern

Ontario. Growing much corn means good farming. Good farmers are sure to grow corn abundantly.

Growing corn well means a number of things. Foremost a well drained field is necessary. This field is likely to give best results if it was in clover hay or pasture the previous year. An application of barnyard manure is almost an essential. It should be so applied as to very near the surface when the corn is planted. The corn should be planted only when the land is in perfect tilth and warm.

To get best results right varieties properly sown is the word. Longfellow, White Cap, Yellow Dent and Leaming may be safely counted on all over Eastern Ontario. About equal areas of each will give good results. Sow thinly in rows 42 inches apart or in hills 42 to 48 inches apart. Keep well cultivated and free from weeds from start to finish. Ensilo when in dough stage. Feed when necessary.

To feed add cut straw and a bite of long hay. Suitable meal to feed along would be bran, oil cake meal, corn and barley, equal parts. Cotton seed meal, gluten meal, peameal or distillers' grain might replace the oil cake meal.

After corn come the soiling crops.

As king of soiling crops, where it can be grown, stands alfalfa. If your corn field was kept clean, is in good heart and lies gently sloping, or is fairly rolling, sow the alfalfa there. Sow a small area to begin with. Sow a goodly amount of seed, 20 to 25 pounds per acre. Inoculate the soil or the seed if possible. Every ton of green feed from the alfalfa field is worth half a ton of milk, every ton of hay is worth a ton of bran or thereabout. As an inspiration to milk production on the part of the cow consuming, it is a marvel. Feed some dry forage along with green alfalfa. Clovers mixed or separate follow alfalfa fairly closely, and are somewhat more easily grown on the average farm. They, like alfalfa, only in a lesser degree, inspire the cow to renewed effort at the pail. Feed some dry forage along with clover just as with ensilage and alfalfa. As makeshifts and good old standbys come our friends the mixed crops. Peas and oats; oats and vetches; peas, oats and vetches; peas, oats and barley; peas, oats, vetches and millet; peas, oats, vetches and Hungarian grass; and peas, oats, vetches, millet and sorghum, to say nothing of innumerable other possible and commendable combinations Their great value lies in their certainty. Sow thickly three to five bushels per acre. Feed when just beyond the milk stage. Too early means a loss of food value, too late means incomplete consumption. As an early ready soiling crop fall rye is of value. Another advantage is it does well on lands so poor other crops will scarcely grow. Sow one bushel per acre in early September. Feed moderately for fear of flavor.

As roughage for winter use corn ensilage again stands first. The addition of roots makes matters still better. For milk production, everything considered, mangels are probably the best.

To grow mangels necessitates suitable soil, well fertilized and well tilled. Plow in August with shallow furrow, work at intervals, manure, replow with shallow furrow and subsoil hook. Sow early, as early as ever you can. Sow on the flat or on ridges thirty inches apart. If on ridges pack well before seeding. Sow plenty of seed, seven to nine pounds per acre. Mammoth long red or gale post varieties are best. Keep clean, cultivate frequently. Harvest before heavy frost. Feed along with ensilage, or alone if preferred. Best if fed along with corn ensilage.

As to clover hay, alfalfa and mixed crops for hay for winter feeding, remarks on these crops for soiling will apply.

Romain millet and Hungarian grass complete the list of the more common and the more advantageous crops for winter forage. These are of value, first, because in case of adverse weather conditions preventing other crops being grown they may be sown even as late as early July, and still give satisfactory results. The soil must be worked well before seeding. It should be very mellow, very fine and yet very firm under foot. Sow thirty to forty pounds per acre. Roll the land after seeding. Cut when in blossom, or shortly thereafter. As a feed for milk production it ranks very high, being about equal to clover, ton for ton.

Q.—How much seed should you sow?

A.—Put in a good seeding. When you come to the timothy bag allow from ten to twenty pounds of timothy per acre, according to conditions, and allow from two to four pounds of alsike, and from eight to twelve pounds of red clover per acre, and if the land is a nice sloping field with the soil in good condition, put in four or five pounds of alfalfa, or a little more per acre, and you will be well satisfied with the result you will get for the slight extra expenditure.

Q.—Don't you have to keep your corn together when you are going to feed your silo?

A.—If you only have a small area. We grow about fifty acres every year, and it takes quite a little while to cut it. I would like to see every farmer grow that proportion of corn. We have a 200-acre farm, and we grow fifty acres of corn, and I would like to see every farmer who owns 100-acre farm grow twenty-five acres of corn. You will say, "Where are we going to get the manure?" That may be the trouble for the first year or two, but that will soon right itself, because you will be able to keep a lot more cattle. We can grow roughage with any other country under the sun. We have ideal conditions for growing feed in this country, and if we will cultivate our fields and crop them in the right way, we will have a solution of the whole problem.

Q.—Do you cut the hay and straw?

A.—No, I feed the hay long. I do not like to cut the hay, but I would cut the straw.

Q.—Is green alfalfa better to feed in the summer than corn?

A.—Yes, it is better.

Q.—What do you think of silo alfalfa for summer feeding from the first of July until the corn comes in the fall; would that give better results than feeding alfalfa green?

A.—No, I would not silo alfalfa. My experience is that we lose anywhere from thirty to fifty per cent. I do not know just how, but I find that we lose that proportion; therefore, I would say, feed alfalfa green, or else cure it for hay. There is no difficulty in growing alfalfa for hay, and alfalfa is such a rapid growing crop that if you have five acres and you are feeding it green, by the time you get over a five-acre field, the first side is ready to cut again. I had a herd of sixty cattle on a fourteen acre field last year, and we made it carry them until the end of July. We divided that field and gave them eight acres on the one side, upon which they ran, and on the other side we kept a strip alongside the fence and fed them, and by the time we got to the end the other end was ready to cut again.

Q.—You did not really pasture them?

A.—We pastured eight acres, and then fed the other six acres until the end of July, and then we gave them the whole thing.

Q.—Tell us how you manage the 200 pigs you have there; do you feed mangels?

A.—Yes, we feed these 200 pigs between 50 and 60 tons of mangels and sugar beets, and we have ten acres of pasture that we run as a pig farm.

Q.—Do you have ten acres set apart for pigs?

A.—Yes. We follow a three year rotation. The first year roots, second year mixed crops, seeding down with different mixtures. We have tried two kinds of grass mixtures and clover mixtures. We cut a crop early if it is going to fall; if it stands up, we let it ripen, and then the next year the pigs are pastured on that grass and clover. They have runs running right across, and in that way we get a variety of feed for the pigs, each run is a little over three acres.

Q.—Do you feed them mangels in the summer?

A.—No. We depend on the corn crop; we depend on rape and things like that. Let the winter look after itself, and get after the summer. I believe that is why we are weak in Eastern Ontario. We are too prone to look after the winter and forget the summer. We say cows can get enough; let them run and they will find it. But they cannot, because it is not there. We have got to get the feed for them in the summer, and if every cheesemaker and buttermaker in Eastern Ontario would get after the farmer and get them to provide feed for their cows in the summer you would not have 3,000 pounds factories, but it would be 5,000 or 6,000 pounds. The idea of depending on pasturage is ridiculous in my experience. If you take the feed condition in Eastern Ontario it will take three acres to keep a cow right, and what farmer can afford three acres to pasture a cow. We must supplement that pasture with some soiling crop. We are cheesemakers in Eastern Ontario, and we must get the milk in the summer, and to get the milk in summer we must have good pasturage and soiling crops.

Q.—Do you use a horse planter for corn?

A.—No, I use a common seed drill.

Q.—How much seed to the acre?

A.—About half a bushel.

Q.—Do you plant the corn in drills?

A.—We plant the corn in rows 42 inches apart, seven or eight inches in the rows or in hills 42 inches apart each way. You will get just as good results, and it is a little nicer to harvest in rows and a little easier to keep it clean in hills. If you have dirty fields I would advise planting it in hills.

Q.—What do you use for fertilizing for mangels?

A.—Just ordinary manure we put on from 15 to 20 tons per acre.

Q.—Rotted or fresh?

A.—Fresh every time. Do not use rotted manure. A ton of rotted manure is not worth any more than a ton of green manure, and to make a ton of rotted manure takes two tons of green manure.

Q.—Is there not more fodder from rotted than fresh manure?

A.—No.

Q.—Do you hoe any corn with the hand-hoe?

A.—Yes, we do; I think it would pay any one to do it. You cannot get quite as close to the corn with a horse-hoe. Being on an experimental farm we probably give a little more attention than the average farmer would, and when our corn crop is off, we want our fields to look as if we had been growing corn and that is what it does look like; there is nothing else there.

Q.—How do you mix this millet and sorghum?

A.—I take about equal weights of Hungarian grass, millet and sorghum, and use about ten pounds of each and mix them together thoroughly and sow by hand about thirty pounds to the acre. If you use Hungarian grass alone you want to use about ten pounds, but if you mix the three it is not necessary to sow quite so much.

Q.—How much corn do you plant per acre?

A.—If you sow in rows you will need to use about half a bushel, if you sow in the drill about 42 inches apart, you can get along with ten or twelve pounds.

Q.—You would not get many ears, sowing half a bushel to the acre.

A.—You have to thin them. Put your rows 42 inches apart, and cut out eight to ten inches in the row. I recommend sowing a fairly good seeding for the reason that there is always more or less corn that does not come up, and if there is a miss anywhere it looks bad and you lose that much land. I am a strong advocate of a good heavy seeding and you can very much more easily eliminate some of these plants than you can replace them. It is a little more expensive but on the average of ten years we find we can grow a crop including rent and manure at $6 an acre for the manure and rent, for about $18, and in ten years the corn has averaged us somewhere around 16½ tons per acre, and when you can grow corn for a little better than $1 a ton, on an average, including rent, labor and every minute spent as well as cost of manure and land, you are doing pretty well. I say the average farmer can do it better than we can, because we have to pay high wages.

Q.—What is the cost of filling the silo?

A.—That is included. I have ten years' figures, of which we keep an exact account every year. We do not give you the good years and keep out the bad. We know that is the average cost in the silo. I calculate that it never costs over $1.50 a ton, and it very often comes down to $1.10 and $1.25 in the silo. If you put in 200 tons you will probably get out 160 or 150. You lose quite a lot. I do not know where it goes but it goes.

Q.—Do you try to get the corn in the silo, as soon as it is cut?

A.—There is no harm in allowing it to lay out a day or two. We have a pretty strong gang of men, and we can take our men from each department, and we cut for a couple of days before we start, and then we pitch in and by the time we have cut a week we catch up. We run our harvester with two teams, and start early in the morning and work late.

Q.—How many pounds does it take to feed a cow?

A.—We have cows that weigh 600 pounds and cows that weigh 1,800 pounds. We do not feed the same to each. Take the average cow and she will use about 50 pounds of the mixture a day. We feed it twice a day, in the morning and at night. We do not give them anything at noon.

Q.—Do you mix any cut straw with the ration?

A.—Yes; fifty pounds of ensilage, twenty-five pounds of roots and five pounds of cut straw, and we feed the corn on the top of that. If the cow is milking fifty pounds a day we may give her ten, or twelve pounds of meal. If she is only milking ten pounds a day she does not get much meal.

Q.—Do you not feed the dry cows any meal?

A.—About five pounds a day.

Q.—You have plenty of men. Do you think it would pay to have these men cut the corn by hand?

A.—We have been experimenting with them for some years, and we find that we lose about half a ton of corn by cutting with the binder. A man will only cut about an acre. The men just work the regular hours, and if the foreman is not looking they do not get a hump on them.

Mr. Dargavel, M.P.P.: We have men in our section that will cut five acres a day.

Mr. Grisdale: Send him down here and I will pay him $5 a day.

Mr. Dargavel: I have a man that will cut five acres a day by hand, but he is no good for anything else in the world.

Q.—Do you feed clover hay in connection with that feed?

A.—Yes, but not very much.

Q.—How many pounds?

A.—Four or five pounds a day. We would feed more if we had it, but when you have twenty horses you would be astonished how many tons we use. You will get better results if you feed clover with the ensilage. Ensilage is not a good food in itself, but it helps other foods.

Q.—There is a fermenting element in there that helps digestion. Is not the binder twine injurious to the ensilage?

A.—No. We never had any trouble, except one time a fool calf thought that binder twine was hay, and after we opened it we found a ball of twine inside.

Q.—Do you recommend feeding twice a day?

A.—Yes, we have tried it over and over again and twice a day is enough.

Q.—Do you pulp the mangels?

A.—Yes, when we feed them with the ensilage, if you have a cow that is giving an extra supply of milk; for instance I was testing a cow last year that was giving sixty-five pounds a day of five per cent. milk, that cow was working, and I used to give her a little bit of mangels between meals, and a little bit late at night; we encouraged her.

Q.—I suppose you would not cut these mangels?

A.—No, I gave them to her whole.

Q.—Is there any rule for estimating the amount of corn in a silo?

A.—Find the cubic contents and multiply that by about 45 and that will give you the contents, forty-five pounds to the cubic foot after it has settled. If it has settled for a long time it may weigh a little more. The height of the silo has something to do with it, but there are not many low silos now.

Q.—That would be a thirty foot silo?

A.—Yes, if you get a forty foot the silage is densely packed at the bottom.

Q.—Do you prefer finely cut ensilage or coarse.

A.—The finer it is the better and the more the cattle will like it.

Q.—Is there more leakage?

A.—I think there is.

A Member: I am feeding finely cut ensilage, and I find the cattle like it better than the coarse.

Q.—At what stage do you prefer to cut the corn?

A.—About a week after you would like to eat it. I do not like it ripe.

Q.—Would you run the risk of frost?

A.—I have not found that frost does a great deal of harm except that you lose weight.

Q.—After a heavy frost wouldn't you lose the leaves?

A.—You lose the juice, but you have the dry material there, and it is not such a high feeding value. One of the best crops of ensilage I have ever seen growing, was grown by Mr. Ness. He had a field of corn that was about ten or fifteen feet high, and the frost came along and froze it. He got disgusted and left it standing there and never touched it until after the Exhibitions were over. Then he went home and cut it. I saw it in the winter, and it was the best ensilage I ever saw. Do not stop feeding corn for fear of frost. It won't hurt it.

Q.—Do you not get more corn in a silo by cutting it finer?

A.—Yes.

Q.—Do you mean you will have forty-five pounds to the square foot if it is cut fine?

A.—I mean the average. You can usually get fifty pounds to the square foot if you cut it fine.

Q.—Should the silo have drainage?

A.—Yes, at the bottom, punch a few holes in the bottom or have no bottom at all except the soil and let the moisture leak out.

Q.—Would you have holes in the bottom for the rats to come in?

A.—No. I would have them smaller than to let rats in.

Q.—Are you troubled with rats?

A.—No, because we do not let them in our silos. They are rat proof, but I have seen silos where they were troubled with them.

Q.—What breed of cow was it that gave sixty-five pounds of milk a day, testing five per cent?

A.—She was a good breed all right.

Q.—How was she bred—a Holstein or an Ayrshire?

A.—A pure bred Ayrshire.

Q.—How long were you milking her when you made that test?

A.—When she had been in milk about a month she was giving that.

O.—Why is it that you do not keep any Holsteins in Ottawa?

A.—I have nothing to do with that.

Q.—Did she continue that for seven days in succession?

A.—Yes. She averaged sixty-four for some days in succession, testing 5.1 per cent. for an average of seven days (Applause.)

The Chairman: I am sure there has been no address that we have heard during this Convention, and we have heard some very good ones, that is of more importance to the dairymen and the agriculturists of the province than the one we have just heard. I would like it to get into the hands of every dairyman in the province of Ontario; it certainly would have a wonderful effect.

Senator Derbyshire: In going through eighteen districts last year, Mr. Glendinning and I found that the weak point was the production of food for the cattle. They were suffering for want of feed to carry the cows through the summer time. I want to say that the most important address that has been given is the one we have just listened to. It is all right enough to make good cheese, and have nice factories and inspectors, but the first important thing is milk. You must have milk to run these factories, and you must have it in large quantities. If not, the factories cannot make a profit. This address has been delivered by a man who knows what he is talking about, because he is doing it every day.

I went down to the Macdonald Farm this summer, and I saw three plots, and written on one stick was the word, "Ordinary Farming." The grass was poor miserable stuff, and right there beside it, was the sign, "Intensive Cultivation of the Soil Without Manure." And in that plot the grass was up a foot high, right beside the other stuff where it was run as an ordinary farmer does it. The third sign was, "Intensive Cultivation of the Soil, Under-drainage and Proper Manure." Everything had been done to give it a growth of the most vigourous kind, and there they had a cedar swamp of grass two feet high and growing vigourously.

You can speak for fourteen hours to an audience, and you cannot tell what these three plots of grass meant to the people of Canada. But one look would tell you what it meant, and I want to get it into your minds that you should get right to work when you get home during this year 1910, and give your land that intensive cultivation.

SECRETARY'S REPORT.

By R. G. Murphy, Brockville.

I am again privileged as your Secretary to give an annual report of our doings as an Association, which is much easier done when one feels as if something has been accomplished during the year. I wish, at the outset, to say that much good has been accomplished in the interest of the dairy business.

The report then went on to speak of the organization of the Board of Directors selected last year, and the appointment by it of an Executive Committee, and then proceeded to say:

The first meeting of this Executive Committee was called at Kingston, on the 12th of February, when the following questions were taken up and discussed, namely:—The Dairy Farms Competition, the licensing of Cheese Factories, the granting of certificates to makers, the appointment of Public Prosecutors, the Dairy Herds' Competition, and other matters pertaining to the industry.

I regret to say that our dairymen of the East did not take as kindly to this new departure (the Herds' Competition) as we had hoped they would, there being only sixteen applications in all, and only nine of these sent in reports.

We divided our territory into five Districts, having due regard to the number of factories.

District No. 1 being composed of: Peterborough, Ontario, Durham, Victoria, Haliburton, Northumberland, and Hastings, less the three Townships of Sidney, Thurlow, and Tyendinaga.

District No. 2: Prince Edward, Frontenac, Lennox and Addington, and the Townships of Sidney, Thurlow and Tyendinaga.

District No. 3: Leeds, Lanark and Renfrew.

District No. 4: Carleton, Grenville and Dundas.

District No. 5: Glengarry, Russell, Stormont and Prescott.

In District No. 1, Mr. J. Gordon Mann, of Bridgenorth, with a herd of eight cows is the winner of the first prize, the average pounds of milk per cow for six months being 5,991¾ lbs.; Mr. William Whitton, of Menie, with a herd of eleven cows, second prize, with an average of 5,140 4-11 pounds per cow; Mr. Thomas McCoy, of Cooper, with a herd of twelve cows, third prize, with an average of 5,030⅓ pounds per cow; Mr. William Smith, of Lakeport, with a herd of eight cows, fourth prize, with an average of 4,495½ lbs. per cow.

In District No. 2 there was but one entry, which was made by Mr. J. W. Duffett, of Adolphustown, whose herd of ten cows produced 6,168 pounds per cow, this being the highest number of pounds produced by any herd in all the districts.

In District No. 3 Mr. Andrew Henderson, with a herd of thirty cows, produced 5,068 2-5 pounds per cow, and Mr. A. M. Ferguson, with a herd of twenty-one cows, produced 4,825 pounds per cow.

In District No. 4 Mr. Henry Davidson, of Prescott, with a herd of fourteen cows, which produced 4,074 11-14 pounds per cow.

In District No. 5 Mr. D. H. McDermid, of Avonmore, with a herd of nine cows, which produced 4,809 pounds per cow, was the only entry.

About twenty district dairy meetings were held during the months of November and December, and except in the case of a few of those held early in November, the attendance was good, and more interest of a general nature than ever before ws taken by the dairy farmers. At these meetings they were shown that there is an urgent need for a cleaner and purer milk supply at our cheese factories and butter factories, and whilst we cannot say that an ideal condition has yet been reached, yet we find a marked improvement in many localities.

Much valuable work has been done by the Instructors during the season, and they have apparently gained the confidence of most of those with whom they came in contact in the dairy business. They have in most instances been well received by the managers of the various factories, which has tended to make their work not only pleasant but also profitable to those whom they desired to assist.

The following are the names of the gentlemen who have been selected by the vote of the people to compose the Board for 1910 and the county or counties which they represent.

I hereto append a list of our members for the year 1909, each member being entitled to a copy of "Farm and Dairy."

I have discharged the duties of Secretary to the best of my ability, but I can assure you that the work has been pleasant, having been made so by the hearty co-operation of the Board and their forbearance. To all I tender my thanks.

The Chairman: This is a very good report indeed, and I think we have every reason to be proud of our Secretary. (Applause.)

Moved by Henry Glendinning, seconded by Mr. J. Hyatt, that the Secretary's report be adopted. Carried.

RESOLUTIONS.

Moved by R. G. Murphy, seconded by J. A. Kerr, "That whereas the success and educational value of this Convention is largely due to the presence of the speakers, who have so ably addressed our meetings, we desire to express our sincere thanks for their kind assistance and presence throughout the various sessions." Carried.

"That we, the Members of this Association desire to express our appreciation of the kindness of the Mayor and Council, and citizens of Belleville generally, for their co-operation in helping to make this Convention a success." Carried.

"That the thanks of this Convention be hereby tendered to the Canadian Salt Company of Windsor, Ontario, through their general manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Members of this Association." Carried.

That we as dairymen feel that we are under great obligations to the Department of Agriculture for the Province of Ontario and also for the Dominion of Canada for the assistance they have rendered the Dairy Industry of Canada." Carried.

"That as an Association we wish to express our satisfaction with the work of the special officers appointed to take charge of the work regarding the adulteration of milk." Carried.

"That this Association wishes to express its gratitude to the several railroad companies for their kindness in reducing rates from all points to Belleville." Carried.

REPORT ON NOMINATING COMMITTEE.

MR. WHITTON: I am sure it affords me a great deal of pleasure to be able to be with you once more in this gathering. This is, I believe, about the thirtieth time that I have attended one of these Conventions, and I must say that I feel pleased to be with you this morning. The names of the officers, etc., of the Association as printed in this report, were then presented, and upon motion of Mr. Whitton, seconded by Senator DERBYSHIRE, the report was received and adopted.

AUDITOR'S REPORT.

MR. JOHN HYATT: It is with a great deal of pleasure that I present the Auditor's Report for the year 1909. We have discovered things that are not so pleasing, but it is no fault of the Association. A tremendous amount of work has been done by the Association for the farmers of Eastern Ontario, and this work requires financial aid; and while that aid has been very generous, the work has become much greater and requires more assistance from the Governments. This was well represented to the Minister last night, and although he gave no definite expression to us he had a smile upon his face, and we were pleased to see it.

We, the Auditors, have carefully examined the books, accounts, vouchers of the treasurer of your Association, and find the expenditure was $3,817, and receipts $3,751.19, leaving a deficit of $65.81. I am told that the Association has only received ten-twelfths of the proportion for this year owing to the change in the fiscal year.

We wish to emphasize the necessity for detail items of expenditure for those having claims against the Association. I would like specially to mention Mr. G. G. Publow and the work done by his two men, Mr. Brenton and Mr. Street. Every 'bus, every meal, every livery, and every railway fare was put down in detail, showing exactly the expenditure made, and we want to ask that this should be done by everyone belonging to the Association.

I have great pleasure in laying on the table the Report of the Auditors for 1909, and I have pleasure in moving the adoption of the Auditors' Report.

The motion was seconded by MR. KERR, and carried.

DISCUSSION UPON CHEESEMAKING.

A MEMBER: Some makers have an idea that when you are making whey butter from fast working milk that you receive more butter out of the whey than you do under ordinary conditions, and I would like to have your opinion on that point. As I understand it the casein absorbs what fat there is in the milk through the coagulation that takes place after the rennet is added, and I would like to know how the fat is separated from the casein?

Mr. Publow: That is an important question. When the rennet causes the casein throughout the mass of milk to solidify or coagulate, the fat globules are imprisoned in the solidified mass, just where they are at the instant of coagulation. When the curd knife passes through the solid mass, immense numbers of the fat globules are exposed on every cut surface, and many of them are disengaged from the free surfaces of the small pieces of the curd during its manipulation, and as a result there is an unavoidable loss of about .2 per cent. of fat in the whey with normal working milk, but extra losses of fat occur when the curd in the soft stage is roughly or carelessly handled, and which is frequently the case when milk is over-ripe.

Q.—In that case you would have a large per cent. of butter from the whey?

A.—Yes, and the cheese will be of poorer quality.

Q.—You get the extra butter at the expense and quality of the cheese?

A.—Yes.

Q.—I find that if the curd is gassy, and I have to wait a long time before salting, that it takes a lot more milk to make a pound of cheese. Is the high yield due to loss of fat?

A.—No; it is more likely to be due to the loss of water.

A Member: If the curd was well cooked, and yet not sufficient acid, would you rather run the whey off or leave it until it got sufficient acid in the whey?

Mr. Publow: If curd was sufficiently firm, I would remove the whey and mat the curd, but you will always have better cheese when the moisture and acid are in right proportions.

Q.—Does high cooking check the acid to a certain extent?

A.—Yes.

Q.—If you get curd well cooked, will it be necessary to have less acid?

A.—No, the firmer the curd is the more acid it will stand.

Q.—How often do you cut an ordinary curd?

A.—Usually three times, once with 3-8 horizontal knife and twice with 5-16 perpendicular.

Q.—Would you recommend a 1-4 knife in preference to a 5-16?

A.—I would recommend a 1-4 knife for fast working milk. It is well to have two sets of knives.

Q.—Don't you think that by improved methods of caring for the milk and the making of cheese, whey butter would be done away with?

A.—I believe that if the milk was properly cared for at the farm and skilfully handled by the cheesemaker, the loss would be so small that the making of whey butter would not be profitable.

Mr. Blakely: I think the reports from my factory will answer this question. It takes 600 lbs. of milk to make 1 lb. of whey butter. I know for a fact that when we commenced to make every other day I separated the whey and made the butter myself, and out of 12,000 lbs. of milk (the last day we were running the cans were left open and the wind was drying the cream) I made 40 lbs. of whey butter. I think if we would cover the cans and properly cool the milk the whey business would die a natural death.

A Member: Don't you think the use of agitators prevents so much of the butter fat going into the whey?

MR. PUBLOW: Rough handling of the soft curd crushes it, and results in an increased loss of cheese solids in the whey, and this is not so likely to occur when agitators are used.

Q.—Would you recommend that the whey be pasteurized?

A.—Yes; if you have stock to feed it to, and you are having the whey returned to the farms in the cans in which the milk was delivered to the factories. I was told that of all the animals killed this year that had tuberculosis, about 80 per cent. of them were hogs. Where do they get it? I appeal to the farmers of this country to pay more attention to the condition in which the by-products are cared for at cheese factories.

Q.—What is the average cost of pasteurizing whey?

A.—About 8 cents per ton. Of course it will vary according to conditions.

THE CHAIRMAN: We are up against one of the greatest calamities that may come against a country, and that is the spreading of tuberculosis.

Q.—Will the pasteurizing of the whey overcome the fruity flavor?

MR. PUBLOW: In several factories where they were having trouble with fruity flavor I had them pasteurize the whey, and the trouble ceased at once.

A MEMBER: We had that experience in our factory, and when we pasteurized the whey we got rid of the fruity flavor.

A MEMBER: Don't you think that it is because the cans are not scalded at the time of washing that we have so many taints in the milk? I believe that very few of them are scalded, and I would like if you would tell how best to do this.

A.—I would not like to say what proportion are not scalded. I would recommend this method of preparing the cans: First, rinse with luke-warm water; then wash with warm water to which has been added some of the washing powder; then put on the cover and pour boiling water on top of the cover and let it run into the can. In this way the hot water is likely to reach all parts. Leave the hot water in for a few minutes, then empty and place the can in the sunlight. Never dry them with a cloth.

MR. SINGLETON: This discussion has brought out a point that is of far-reaching importance to the dairy industry of this country. In the first place, it is absolutely necessary to have some loss in the manufacture of cheese. We cannot do it without a trifling loss, but it is possible to reduce it so low that there is a loss no greater than two pounds per ton, and we have records showing that they are getting as high as eight pounds per ton. If we get it down to two pounds it does not pay to put in a plant for manufacturing whey butter, and I would like to ask you, "What effect is it going to have on the British market?" This is where we want to do the missionary work this year. We don't want it to get abroad in the Old Country that we are doing two things in the factories of this country. In one factory they put in a plant to make butter this year, and they skimmed the whey and got good returns in butter, and the farmers liked it; and when it came the first of November the idea of some was to make butter from the whole milk, and the idea of others was something else. The result was that they made butter one day and cheese the next, and you can easily see how suspicion will arise there. The question might be asked, "Why are we doing this dual business?" When I asked this question the reason given was that the cheesemakers could not take charge of all the butter that was made every day. We must be

The Convention then adjourned.

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

ANNUAL MEETING.

The Assembly Hall in the New Engineers' Building, St. Thomas, was by far the most up-to-date place in which the Western Dairymen have as yet held their meetings. Everything was new and inviting, and the accommodation was all that could be desired. There was a splendid attendance at the majority of the meetings, and the very best of order was maintained throughout.

PRESIDENT'S ADDRESS.

By J. J. Parsons, Jarvis.

As President of the Western Dairymen's Association, it affords me a great deal of pleasure to welcome you to the city of St. Thomas at our forty-third Annual Convention.

As I address you this morning, I feel that I am speaking to men of intelligence, and that it requires a man with more than the ordinary brain power, and one who has been properly prepared in the schools of this country, to make cheese and butter as it is made in this province at the present time. If you will go back a few years in the history of this industry and compare the present output with that of even ten or fifteen years ago, you will see a very wonderful improvement in the quality. The system of instruction that was put in operation in Western Ontario a few years ago has been well carried out. The men who were then at the head of the industry looked into the future and saw the need of making cheese and butter of a more uniform grade and better quality in order that we might compete with the output of other countries that are sending the product to the British Market, and these men contributed from their own private means to organize and start a course of instruction to further this work. As a result of that effort, we have to-day in operation in Western Ontario the best system of instruction that is known in any province or state, or in any country where cheese and butter is manufactured. We have to-day a system of instruction that originated from a common centre, and is so uniform that we have a most satisfactory output. Yet we do not wish to say this morning that the output in every respect because we know that there is room for improvement, and it is up to us, as the chief men engaged in the dairy industry, to see that improvement is made in the future.

Perhaps there has been no time in the history of the Association where we were required to watch more closely the welfare of the dairy industry than the present, although we have outstripped a number of the competitors that we had a few years ago. Yet there are others looming up. New Zealand, particularly, has made wonderful strides in the dairy business under the able instruction of a Canadian, and in order to hold our own with New Zealand we will need to be bright, sharp, and wide-awake to the welfare of the industry.

There are a number of great industries in Canada. Many of them that had a very humble origin, yet have reached out to a magnitude second to that of no other country. We are proud to say that dairying is one of these industries, and it has kept pace with the progress made in other lines, and to-day it is the chief part of the agricultural industry of the Dominion, and is a source of great revenue to all those who engage in it. It is our duty to see that it increases in volume and that more wealth comes out of it. Some of you may be inclined to think that because the export of trade has fallen off somewhat, that the industry has taken a step backward; but when you come to consider the increase in the population of this Dominion and the increase in the home consumption, you will see that this is the chief reason for the falling off of the export trade, and in looking over the reports of Western Ontario for the past season, we find that there has been an increase in the amount of butter and cheese manufactured.

DIRECTORS' REPORT.

Your Directors are pleased to report that throughout the entire work of the Association for the season just closed we can justly claim progress in all the different lines of work connected with dairying.

Cheese. The total exports of Canadian cheese from May 1st to Dec. 30th, 1909, are reported as 1,916,667 boxes, an increase over 1908 of 41,539 boxes. The value of this cheese at the average price received during 1909 (11½ cents) would be about $17,633,336.

Butter. The total exports of butter for the same period are reported as 39,505 packages, a decrease of 53,911 packages. The value of this butter would be about $508,025. This makes a total value of the cheese and butter exports of approximately $18,141,361.

A development of the season has been some shipment of cream by Canadian factories to the United States since the new American Tariff was put into force. These shipments of cream have been variously estimated as equal to 15,000 or 20,000 packages of butter.

Our home consumption of milk, cream, and other dairy products, together with the home trade in cheese and butter, is rapidly increasing.

Quality Must be Maintained. We wish however to strongly point out that in our estimation never in the history of the Canadian cheese industry have we more reason to put forth strenuous efforts to maintain and improve the quality of our cheese than in the future. Other countries are making rapid strides in the way of production and quality, and we must see that the quality of Canadian cheese stands second to none if we intend to maintain our superior position as the foremost cheese exporting country.

Western Ontario Output. Coming to Western Ontario we find that we produced in 1908, 17,221 tons of cheese, or about 459,227 boxes, which is 394 tons or 10,507 boxes more than in 1907. The exact returns for 1909 are not yet in, but indications point to a larger make than in 1908, as we find that out of our 211 chese factories 64 will make more cheese, 59 about the same amount, and 70 factories a little less than in 1908.

Our creamery butter output in 1909 was 10 tons greater than in 1908, so that we have no great cause for complaint in so far as the total output and the prices received in Western Ontario are concerned.

NEW FACTORIES. Several new factories have been erected the past season. We again wish to point out the fallacy of continuing to build factories in sections already served by existing factories. The tendency will be, if such practice is continued, to bring the make of many existing factories down below a paying basis, and cannot be in the best interest of the industry, since it is well known that when the output of factories either from insufficient production of milk or from the fact that factories are too close together becomes too small the cost of making rapidly goes up. It is difficult to secure the best makers for such small factories, and when repairs are required it becomes almost a hardship to make these necessary repairs and keep the factory and equipment up-to-date.

We notice, however, that sections which previously, or within the past twenty years, paid very little attention to dairying are beginning to take an interest in this industry, and we think it would be quite possible to build factories in these sections which would be profitable to the patrons. It is becoming recognized more and more each year that not only are there profits to be obtained in combined dairying and hog raising, but also that there is no other system of farming that will keep up the fertility of the soil and increase the value of the land with as much profit as dairying.

FACTORY IMPROVEMENTS. In the different factories and creameries of Western Ontario all that could be reasonably expected of the proprietors or those in charge of them in the way of improvements either in adding improved machinery or other equipment, or improving the general appearance and surroundings, has been done, and a considerable amount of money has been expended in such improvements.

PASTEURIZATION OF WHEY. The pasteurization of whey, which had been experimented on for the past two years, has proven where adopted this past season of great advantage, and your Directors and Instructors believe it has been a great help in overcoming some of the difficulties of previous seasons.

INSTRUCTION WORK. We also find that the course of instruction given by the different Instructors in the several districts is quite uniform, and has certainly assisted in producing an even grade and better quality of cheese and butter.

SPECIAL OFFICER. From the past two years' experience your Directors believed it wise to continue the services of a special officer to take charge of all cases where milk was found to be adulterated, and they are pleased to report that it has been the means of reducing the number of such cases and assisting to stamp out this objectionable feature of the industry.

BOARD MEETINGS. Your Directors have held different Board Meetings during the season to consider and act on all matters pertaining to the work, and in conjunction with Directors of the Eastern Ontario Dairymen's Association, have waited upon the Minister of Agriculture for Ontario asking certain changes to be made in the Dairy Act to further improve it. The question of makers' certificates was taken up, and we believe a satisfactory arrangement has been made whereby certificates will be granted to cheese and butter makers.

DAIRY HERD COMPETITION. Your Directors believe it to be a decided advantage to the members of this Association to continue to hold a Dairy Herd Competition, the results of which will be announced later on.

DAIRY EXHIBIT. Your Directors also continued the Dairy Exhibition in connection with this Convention, giving handsome prizes to the winners in the different classes. We are pleased to see the continued interest taken in this Dairy Exhibition, and judging from the number of entries received this year we have the largest exhibition since this phase of the work was taken up. The Dairy Exhibit is doing a great deal to improve the quality and finish of our cheese.

SPEAKERS FOR ANNUAL MEETINGS. We also wish to put on record our sincere appreciation of the generous assistance given by the Ontario Department of Agriculture to this Association and its work at all times.

Upon motion of the Chairman, seconded by Mr. Scott, the report was received and adopted.

FINANCIAL STATEMENT.

The financial statement was then read, and upon motion of Mr. Scott, seconded by Mr. Dempsey, it was received and adopted.

REPORT OF THE COMMITTEE ON THE DAIRY HERD COMPETITION.

By FRANK HERNS, LONDON.

This competition was conducted practically on the same lines as last year and any of you who entered into the competition have a set of the rules.

Your Directors decided to again carry on a Dairy Herd Competition donating $100 in cash prizes to patrons of cheese factories and creameries in Western Ontario. Ryrie Bros. again very kindly donated a Silver and Bronze Medal. The prizes offered and rules of competition were as follows:—

Two Diamond Hall medals (enclosed in handsome cases). Donated by Ryrie Bros., Toronto.

$100.00 in cash prizes donated by the Dairymen's Association of Western Ontario.

To the patrons of cheese factories who furnish the first, second, third, fourth and fifth largest amount of milk per cow to any cheese factory in Western Ontario from May 1st to Oct. 31st, 1909.

1st. A silver medal and $15.00 in cash; 2nd, $15.00 in cash; 3rd, $10.00 in cash; 4th, $6.00 in cash; 5th, $4.00 in cash.

To the patrons of creameries who furnish the first, second, third, fourth and fifth largest amount of butter fat per cow to any creamery in Western Ontario from May 1st to Oct. 31st, 1909.

1st. A bronze medal and $15.00 in cash; 2nd, $15.00 in cash; 3rd, $10.00 in cash; 4th, $6.00 in cash; 5th, $4.00 in cash.

RULES OF DAIRY HERD COMPETITION.

1st. No herd of fewer than eight cows will be allowed to compete.

2nd. Figures must be taken from the cheese factory or creamery books, and the number of cows and the total and average amounts of milk or butter-fat must be certified to by the cheese or buttermaker, and the secretary of the cheese factory or creamery.

3rd. The average amount of milk or butter-fat per cow must be calculated on the basis of the total number of cows from which milk or cream is sent to the factory during the season of six months, May 1st to October 31st, 1909.

4th. No substitution of one cow for another will be allowed.

NOTE.

Example 1.—If the patron begins to send milk or cream to the factory on 1st of May from say eight cows and continues to send to the 31st of October from the same herd he is eligible. Larger herds the same.

Example 2.—If the patron begins to send milk or cream to the factory on 1st of May with say only seven cows in milk and in June, or at any other time, another cow freshens, and in July, or at any other time, another cow freshens, making in all nine cows, the patron is not barred from competing, provided the total number of cows (9) is used for dividing the total milk or butter-fat to find the average amount of milk or butter-fat per cow for the season. Larger herds the same.

Example 3.—If the patron begins to send milk or cream to the factory on May 1st, with say eight cows, and in June or any other time in the season, for some cause, one cow drops out of the herd, the patron is not barred from competing, provided the total number of cows (8) is used for dividing the total milk or butter-fat to find average amount of milk or butter-fat per cow for season. Larger herds the same.

Example 4.—If the patron begins to send milk or cream to the factory on May 1st with say eight cows in the herd and sometime during the season, for some cause one or more cows drop out of the herd, the patron will not be allowed to substitute a new milch or any other cow in order to keep up the milk from the herd. Larger herds the same.

CLASS I.—CHEESE FACTORY PATRONS.

1st. John W. Cornish, Sprucedale Farm, Harrietsville, Ont., 50 acres in farm, 9 Holstein grade cows, 59,727 total lbs. of milk, 6,636 lbs. of milk per cow, $550.96, total money, $61.22 money per cow, 1,194.5 lbs. of milk produced per acre.

2. John Vanslyke, Dunboyne, Ont., 100 acres in farm, 11 Holstein grade cows, 71,828 total pounds of milk, 6,529 lbs. of milk per cow, $683.56 total money, $62.14 money per cow, 718.28 lbs. milk produced per acre.

3rd. Mason Bros., The Maples, Tyrell, Ont., 280 acres in farm, 21 Holstein and Holstein grade cows, 132,127 total lbs. of milk, 6,291.76 lbs. of milk per cow, $1,098.49 total money, $52.31 money per cow, 471.8 lbs. of milk produced per acre.

4th. A. E. Hulet, Evergreen Stock Farm, Norwich, Ont., 120 acres in farm, 8 pure bred Holstein cows, 48,325 total lbs. of milk, 6,054.25 lbs of milk per cow, $420.72 total money, $54.15 money per cow, 402.7 lbs. of milk produced per acre.

CLASS II.—CREAMERY PATRONS.

1st. R. M. Bowie, Maple Lane, Beachville, Ont., 50 acres in farm, 11 grade Holstein cows, 2,472.4 total lbs. of butter fat, 224.7 lbs. of butter-fat per cow, $706.08 total money, $64.19 money per cow, 49.4 lbs. of butter-fat produced per acre.

2nd. E. W. Lick, Beachville, Ont., 100 acres in farm, 12 Holstein grade cows, 2,546.2 total lbs. of butter-fat, 195.8 lbs. of butter-fat per cow, $696.50 total money, $53.58 money per cow, 25.4 lbs of butter-fat produced per acre.

3rd. William Hutchison, Pleasant Grove, Princeton, Ont., 200 acres in farm, 21 Durham cows, 3,738 total lbs. butter-fat, 178 lbs. of butter-fat per cow, $983.08 total money, $46.81 money per cow, 18.7 lbs. of butter-fat produced per acre.

4th. Courtney Carr, Ingleside, Beachville, Ont., 100 acres in farm, 20 Ayshire and Jersey grade cows, 3,120.7 total lbs. of butter-fat, 156 lbs. of butter-fat per cow, $860.95 total money, $43.10 money per cow, 31.2 lbs. of butter-fat produced per acre.

5th. George Bouchier, Echo Farm, Washington, Ont., 25 acres in farm, 9 Jersey grade cows, 1,184 total lbs. of butter-fat, 131.5 lbs of butter-fat per cow, $261.62 total money, $29.06 money per cow, 47.3 lbs. of butter-fat produced per acre.

6th. Albert Goettling, Pine Grove, Baden, Ont., 100 acres in farm, 10 Holstein and Jersey grade cows, 984 total lbs. of butter-fat, 98.4 lbs. of butter-fat per cow, $213.48 total money, $21.34 money per cow, 9.84 lbs. of butter-fat per acre.

THE CHAIRMAN: I am sure you have listened with a great deal of pleasure to this report of the Dairy Herds Competition. This part of the Association's work is only of a few years' standing. You will agree with me that in order to excel or to improve in any line of work there must be some incentive. The Western Dairymen of Ontario felt the need of putting forth some special effort in order to induce the producers of milk to increase the amount of milk produced per cow, and they thought this scheme was the most feasible. I am pleased to see the keen competition that has taken place with regard to this. We have one of the winners with us to-day. Mason Brothers stood 5th in the competition last year, and they stand 3rd this year. If Mr. Cornish is present, I take pleasure in asking him to come forward and say a few words.

J. W. **Cornish**, Sprucedale Farm, Harrietsville: I am sure it gives me much pleasure to be here at another Dairymen's Association. I am also pleased to be a winner in this Dairy Herd Competition for 1908 and 1909.

I am not a public speaker, but I will try and answer any questions you may ask me. I had no intention of entering the competition this year until about the first of December, when I saw an article in the *Farmers' Advocate* saying that there was not going to be a sufficient number of entries to take up the prizes, and I concluded to enter my herd in order to make up the number, and I have won out. I started with six cows and raised two calves, and after the 20th of May I had three more cows, which made nine, and I can give you the figures for each month.

Q.—What was your method of feeding during the summer?

A.—I always fed a little bit of meal of some kind up till they got green food, then oat chop, middlings or bran. I never fed more than two quarts at a time, that is when they got out on the grass, and when the grass was good, one quart. I always fed them at the milking hour.

Q.—Do you think it is good to feed meal when they are on good pasture?

A.—If you want to see how much they are going to give that is about the best way to get at it.

Q.—Did you keep any record of how much grain you fed during the six months?

A.—No, I did not.

Q.—I would like you to figure that out another year.

A.—I may not try it another year.

Q.—Did you feed any grain at all when on the pasture?

A.—Yes.

Q.—Did you feed the meal also?

A.—Yes, I never quit the meal. Of course, it got very dry in our part of the country, and I suppose it did in other places. We sowed from about half an acre to three-quarters of an acre of Hungarian grass and as soon as it started to head up I commenced feeding it until the corn came and then I fed corn.

Q.—Do you know what the cows averaged for the season?

A.—Not exactly. I sold quite a few of the calves. The cows averaged $91 apiece, and I have the two calves I am raising.

Q.—The total pounds of milk per cow?

A.—I do not know. I did not take time to figure that out.

Q.—Was the $91 from milk and calves?

A.—Yes, that is from the first of April to the first of January, $91 per cow.

Q.—How many calves did you sell?

A.—I sold six or seven. I sold them for $5 apiece this year; they were cheap.

Q.—How old were the calves??

A.—From three days to a week old.

Q.—Do not you think you are wasting money feeding chop?

A.—Green feed is the cheapest, there is no doubt about that; but if you give them a little chop it will keep them in better condition.

Q.—Did you use a silo?

A.—Yes, but not much for summer feed. I only had enough left over for two weeks.

Q.—What stage of the growth did you start to feed the corn?

A.—As soon as it commenced to ear.

Q.—Not before?

A.—No. I do not think it is much good for milk till there are ears on it.

Q.—Did you keep on feeding ensilage with the grain?

A.—No, not in the summer season; I did not have enough to do it. I just fed it for two weeks. I would have fed it if I had had it.

Q.—Do you think the ensilage would be equal to the Hungarian grass?

A.—I think it is with a little bit of meal added. I do not think there is anything that will beat the Hungarian grass as long as it will last. Last season it got pretty dry.

Q.—About what time did you sow the Hungarian?

A.—About the third of June, a little later than that this year because it was wet during the first part of the season.

Q.—Is Hungarian harder on the land than a corn crop?

A.—It is always said to be, but I sowed it on the same land three years in succession, and it did not hurt it very much.

Q.—What did you fertilize that land with?

A.—Manure.

Q.—Did you ever try feeding alfalfa?

A.—No. On a fifty acre farm there is not much chance to grow everything.

The Chairman: It affords me a great deal of pleasure this afternoon to introduce Mr. N. P. Hull, of Michigan. He is Master of the Grange in the State of Michigan, and one of the directors of dairying, and President of what is called the American Dairy Farmers' Association. You will understand from this introduction that Mr. Hull is a man of considerable experience. He has been attending Association meetings in different parts of the United States and he comes to us to-day to favor us with an address on "The Value of Cow Testing Associations," which is a very important subject and one that you will all undoubtedly be interested in. It is a necessary feature of the work if you want to increase the production of the cow. Without any further remarks I will now call upon Mr. Hull to address you.

THE VALUE OF COW TESTING ASSOCIATIONS.

By N. P. Hull, of Dimondale, Mich., U.S.

I assure you that it is with a great deal of pleasure that I came across from Michigan to meet with the dairymen of Canada. It is the first time I have had the pleasure of addressing a good Canadian audience. However I do not feel so far from home or so out of place. All along the border line of our state I find that one-half to two-thirds there are men who have drifted across the border from Canada, and some of the very best farmers and dairymen in Michigan originally came from Canada; and I concluded that where they send away so many good men, there must be a plentiful supply of good men left. (Laughter and applause).

After all I have heard about the intelligence of your Canadian farmers, I was pleased to have an invitation to come and address you. I want to extend to you an invitation to attend the next American Dairy Farmers' Association meeting, which will probably be held in Milwaukee in connection with the National Dairy Show next October. This year, when the farmers were called together over there, we found about two-thirds as many people present as there are here to-day, and the next day when the National Creamery Butter Makers' Association met, there were three times as many in the hall. There are many and many times over, as many dairymen as there are creamery and butter makers, and the man with the cow needs information and instruction and the enthusiasm that comes from these meetings; yet we only had one-third as many dairy farmers present as there were creamery men.

I happened to be elected president of that Association, and it is my hope and desire that when the next American Dairy Farmers' Association meets that it will have as many in proportion to the whole number of dairymen present, as there are of the National Creamery and Butter Makers. It was thought first that we would call this the National Dairy Farmers' Association, but someone called our attention to the fact that here were the Canadian provinces, and that we needed the inspiration and enthusiasm and the information that they possessed, and we made that Association broad enough so that our Canadian dairy farmers could come in and join hands with us in uplifting this great cause; so instead of calling it the National Dairy Farmers' Association, we called it the American, and it is just as much an association of the Canadian farmer to-day as it is of the farmers of the States.

Your President has kindly consented to appoint ten delegates from this Association to meet with the American Dairy Farmers' Association, and I hope to see these delegates present.

What I know about dairying and the dairy business was not learned at the Agricultural College in Michigan nor in any Dairy School. I learned it in my cow-stable, rubbing up against the dairy proposition itself, feeding the cows and milking them, and using a lead pencil to make notes, so as to find out where the profit was, and how to get at it. You who have been keeping track of the cost of production have been attending the same school, and if you have watched results as closely, your information is just exactly as valuable as mine. I do not want to make an assertion that is not true. If I know anything about the business, I want to impart that information this afternoon, and you can ask me questions any time you have a mind to; and if I make a statement that you do not believe is true, ask me about it and I will prove it to you. At any rate we can talk the matter over.

I am going to say to you that you and I who are engaged in dairying are putting our lives into the proposition, and what we shall gather in the way of profits measures the value of that part of our time that we put into it. It seems to me that the man who is putting part of his life into a proposition ought to feel that that life of his is of sufficient value—that it will pay him in such a way as he will get the most possible out of it. I am sure you will all agree with me that want of knowledge is what is hampering the dairy farmer who puts his life into feeding and milking those cows, and taking care of the product, from getting the profit he ought to get. Surely the price of dairy products is high enough. You will find every year that the man on the dairy farm works more hours than he ought to work, and you will find the good woman works harder than any woman ought to have to work, and you will find the boys and girls working harder than they ought to; and when the end of the year comes, that man is no better off than he was at the beginning, and even after a decade of years he has nothing to show for his hard labor except the bare fact of having existed. I say to you, my friends, that it is too bad a man should do that. Then again, you will find other men who are not making 25 or 50 per cent. of what it is possible to make.

Now we are putting our lives into it, and should not we all join hands together and try to raise the plane of American dairying, so that we will get more for the time we put in? I ask you again, "What is hampering the American dairying interests?"

There are two things. The first thing is a poor cow—a cow that a man has to feed, milk, and care for, and that does not show any profit, or a mighty small percentage of profit. I have travelled across this Canadian province, and although this is my first stop, I am sure I can say that your cows are not very much better than our cows over in Michigan. I am sure I can say that there is many a man to-day who is milking cows, and trying to make dairy cows of what God Almighty made for beef cows. A man is putting in his time with that poor piece of dairy machinery and is not getting results out of it that he ought to get. Then again, there are too many good cows in Canada, the same as in the States, that are not paying their owners the profit they ought to pay, because they never had a decent chance—because their owners never cared for them in such a way as to make it possible for them to make the profit they ought to make. As I said before, there are two things hampering the dairy business of to-day, poor cows and lack of information as to how to take care of good cows, and then beyond that is lack of inspiration to do as well as we know how to do. If I can convince the Canadian dairyman that he must adopt a policy that will weed out and get rid of these poor cows and put good cows in their places; if I can say something to give these Canadian dairymen the information that they ought to have about their business so that they will know how to go at it; if I can give them inspiration and an incentive to go home to their dairy farms and work them to the best possible advantage; then I have come over here for some purpose, and it will have paid the people of Ontario to have sent for me to come. I want to do a little something along that line if I can. What you lack more than any other one thing is inspiration and the incentive to do as well as you know.

I hold that there are three kinds of cows in America; one kind of cow takes her food, digests and assimilates it and because of her inborn temperament, the law of her nature, she takes that digestive food and turns it into flesh; she puts it on her back. True it is that she furnishes enough milk to take care of her young. It does not make any difference whether her name is Shorthorn, Hereford, or Galloway, if the law of her nature is such that she converts it into flesh, she is a beef animal, and you had better make beef of her.

There is another kind of cow that takes her food and digests it, and because of her inbred disposition, or the law of her nature, she takes that digestive food and instead of getting flesh she converts it into milk, and puts it into the milk-pail. That cow is a dairy cow, and it does not make any difference whether her name is Holstein, Ayrshire, Jersey or Shorthorn, if she is of that temperament, and if the law of her nature inherited from a long line of ancestors prompts her to put it into the milk-pail, she is a dairy cow; and I want to say to you, my Canadian farmer friends, that you had better keep that kind of cow, because she will do you more good than any animal that ever walked on four legs.

Then there is another kind of cow that takes her food, digests and assimilates it, and God only knows what she does with it. She neither makes beef or milk of it, and she is of no value to anyone, under the circumstances.

Q.—What would you do with that last sort of cow?

A.—I am going to tell you right now. This is not a story. These are facts. The Governor of Michigan is a cheese man. He has fourteen factories, and when he was Secretary of the State, I went with him to every cheese factory that he had, and I talked to the patrons of his cheese factories. At the annual meetings, I gave them my idea of selecting food and caring for cows. He asked me to come back again, and he said to me, "Surely there must be something that will impress some of these facts upon these dairymen." We thought of a scheme and the next morning, after the Governor had made his report at the factory, he asked each one of his patrons how many cows they delivered milk from the year before. Mr. Brown said he had twelve, Mr. Jones had fourteen, and so on. He introduced me, and I went over this matter, how to select cows and how to take care of them, and when I got through, the Governor came back and made his report, and he said the lowest man delivered 2,900 pounds of milk per cow, and the highest man delivered 8,700 pounds of milk, and these two men lived just exactly one mile and a quarter apart. A man who sat to the left dropped his head. He was a bright looking fellow, too. Then he looked over at the Governor, and said, "Fred, am I the man that delivered only 2,900 pounds of milk per cow?" The Governor said, "I did not intend to say who it was, but as you have asked me, you are the man." That fellow looked right over at me, and he said, "If you had cows that would only give 2,900 pounds of milk, what would you do?" I said, "My friend, if I had given these cows a decent chance to give milk, if I had fed them and cared for them in a way to enable them to give milk, I would sell them, and do it quick." He came right back at me with this proposition, "Would you sell them to your neighbor?" I thought just a moment, and I said, "I will tell you what to do. If you have a neighbor that you do not like, if he is a mean, despicable man, and you want to get even with him, go over and say to him, "Neighbor, if you will agree to take care of five of my cows and keep them for five years, I will give them to you And if you can agree to get that man to take care of these cows for five years, give them to him, but for goodness sake don't sell them to him, that is doing something too mean altogether." Then I said, "Next summer, when you go out on your back porch and watch him sweat in the hay field, harvest field, and corn field to get feed for these brutes, you can feel tickled because you have given him animals that will take the hard-earned dollars out of his pocket." There is a moral that goes with this: If it is a mean trick to give another man such cows as that and make him promise to keep them, a man is doing a mean trick to himself and his family if he keeps them, and there are a lot of men in this Province of Ontario that are doing just exactly that same thing. Now about getting rid of them. I want to show you the necessity of this thing. Two young men just starting life were dairying over in my section of the country. They had small farms and kept about sixteen cows each. They were making butter. One got a pair of scales, and a Babcock tester so as to know what the cows were doing. He weighed the feed and weighed the milk. I said to the other young man, "Why don't you do that?" His characteristic reply was, "I have not got the time to monkey with it. If I feed these cows and milk them and take care of them, it keeps me busy." What were the results? Three years afterwards, one young man was getting 250 lbs. of butter per cow, and the other young man was getting only 200 pounds. You know the one which was getting 250 pounds? It was the one that was weeding out the poor cows. It took about 150 pounds of butter to pay for the cost of keeping the cows, and the outcome was that one man was getting 100 pounds of butter profit and the other 50; and the sad thing about it was that he had to come to the time when he had to monkey away another year. He must plant his corn, harvest his crops, and feed his cows for a whole year and got only 50 pounds of butter profit; and it took him two years to make as much money as the other one made in one. I want to say to you that a man in the dairy business makes a big mistake when he thinks he cannot afford to take time enough to know his own business. Dairymen as a class are putting in two years to accomplish what they could do just as well in one year. Is there any man here who does not believe that? Is there any man here who will get up and argue with me on that point? If we use the methods that we should to get better cows, and if we cared for them as we ought to, we could make as much profit in one year as we are making in two. How are you going at it to do it? In support of this contention, we Americans claim we are the cream of the world. We point out to our friends across the water the fact that 300 years ago there was just a little band of farmers here, and in the 300 years that have elapsed since then, we have planted and sowed until this year we produced over $8,000,000,000 worth of farm crops, and we are producing about 145 pounds of butter per cow. If you go across to the little country of Denmark, they are producing about 240 pounds of butter per cow, and in Holland they are producing 250 pounds per cow. In spite of our boast of intelligence and in spite of our boast of our wonderful hustle and energy, we have got to hold up our hands and say that the farmer in little Holland is beating us and beating us a long way. Now, my friends, if we are interested in improvements, we must get rid of these poor cows. I stood in a barn over across the border, the owner of which was a Canadian, and he said to me: "Mr. Hull, how much difference do you suppose there was in the profit of these two cows?" I said, "I cannot tell, I do not believe the man lives who can look at two cows and tell the difference." "Well," he says, "I know, because I have kept track of it. I know just what these cows have done in the last year. That right hand cow made me just ten times the profit that the left hand cow did." Now just stop and think! Supposing my friend, Mr. Parsons, and myself were dairying on farms side by side, and he had cows like the right hand cow, and I had cows like the left hand cow. At the end of the year, he would have ten times as much cash profit as I would have. That means that I must sow and reap and milk for nine years more before I will have as much profit as he would get in one year. For the last ten years that I have been going up and down the State of Michigan, I have been advocating that dairymen should buy scales and a Babcock tester, and know their business. Many men have said, "That is right," but in spite of that, how many of them have done it and why have they not? Because they do not believe it would pay to do it? They would all like to do it, but when the time comes to test the milk, it is time to put in the corn, and then they are busy, and they say, "I will wait till to-morrow"; and then they will put it off again, and the result is that not 1 per cent. of them are doing it.

A young man came across the water from Denmark, and he started as a creamery butter maker, and he finally became a member of the Instruction Department in Michigan. He said: "Over in Denmark the farmers could not pay taxes if they raised beef. They had to go into dairying, and they found that a large percentage of their cows were poor dairy cows and their average over there twenty years ago was only 112 or 114 pounds of butter per year. The Government took a hand in it, and they subsidized Dairy Testing Associations, which is simply a co-operative method of doing this work. The men come together and they agree to pay $1 per cow, and to have a man whose business it is to visit the herds once each month, weigh the feed, make a computation of the value of that feed, weigh the milk that each cow produced and test it and at the end of the year they furnish the man with a sheet for every cow, and that sheet would tell just when that cow freshened, what it cost to feed her each month, and what she gave per day, the amount she produced in butter fat, and the value of it and the value of the skim milk."

Is there any man here who thinks that information with regard to his cow would not be of value to him? Is there any man here who thinks that information would not be worth $1 per cow? It would be worth it for the purpose of building better dairy herds and saving heifer calves from the best cows. They now have from 1,200 to 1,400 of these Dairy Associations in Denmark, and starting twenty years ago with an average production of 114 pounds they are now up to 214;—they have almost doubled their production per cow. These 114 pound cows were a losing venture, and the 214 pound cows make it possible for these men to succeed.

We started our first Dairy Testing Association under the tutelage of this man Able, who came from Denmark. We induced the men in one section to come together and start this work. This was four years ago, and what are the results? At that time there was not a pure bred dairy sire in that whole community, and to-day there are twenty-six pure bred dairy sires in that organization, and nearly every farmer is taking up testing. This year it will be necessary to have two organizations in that district. I was up there this year, and visited many of the men, and I never saw such a change in a dairy community in my life. I never saw so many new barns and so many improved barns, so many cement floors, and such a large improvement all along the line of dairying as I saw there. Their enthusiasm has increased just by the bare fact of their coming together under the influence of this young man, and they talk to each other about their herds and they all get inspiration from the very fact that they are working together. I noticed at this meeting that a gentleman was asked the question what it cost to keep his cows, and he said he did not know. Can any of you tell me what it cost you last year to keep your cows, if so raise your hands. There is just one man. Supposing I told you a merchant did not know the cost of the goods he was selling you; you would know at once he would not make a success of his business. I tell you, my friends, we are interested in the profit in the business, and the profit is the difference between the cost of production and what we get for it. It is just as essential that a man should know and study the cost of production as it is that he should know his selling price. Some one says, "Does it pay to feed meal to the cows in the summer time?" Go into a Testing Association and find whether it does or not. Supposing you can get along without feeding grain, that is just what you want to know. If you can make more profit out of your cows without feeding grain then you do not want to feed it. The thing you are after is the net profit per cow. I was over in one of our counties on the border line talking, and a fellow said to me after the meeting: "I heard you talk dairying five years ago first, and I had never fed very much grain; and I made up my mind that if I could make more profit feeding grain I would go home and buy some of these concentrates, these feeds that carry high protein contents, and I would feed my cows with it. I fed my cows better that winter than I ever fed them before, and I made more profit; the next year I fed them better still, and it has actually taken me five years to get confidence so that I would dare to invest money in dairy feeds. He added, "Now I know the better I feed the cows the better they pay me," and one of the great values of a Cow Testing Association is *to know*. Now you will go home and you are not quite sure that under your conditions it will pay you to do it, and you have not faith enough to feed the cow what she ought to have, and you will never get that faith by listening to other people's experience. The only way is to test for yourself and be satisfied. The result of forming these associations in Michigan is that we have much better dairying conditions. I have just come from a visit to Vermont. In an Association over there the five best cows yielded a profit of $90.72, while the poorest cow yielded a loss of $15.36, and the problem I want figured out is this: "How many of these poor cows must a man have to make as much profit as he would make from one good cow?" (Laughter). That is a hard proposition to figure up.

Over in Vermont we organized a Testing Association. I went to a market gardener and he said, "I have only five cows, and I am going out of the business because there is no profit in it; I am going to do more market gardening and less dairying. I believe Testing Associations are right, and if you cannot get enough men come back to me and I will go in." He added, "I want to sell my cows and I will take $35 for any cow; they may come and take their choice." He went into the Testing Association, however, and for the first year's results he had a profit from one cow of over $52. Another cow paid $7 profit. A neighbor came over to him and he says, "Mr. Brown, I understood that you said you would take $35 for any cow you had." He replied, "I did a year ago." "Well," he says, "I will tell you what I will do, I will give you $75 for that cow that made $52." But Brown answered, "I do not want to sell her; I am going to buy more cows, for there is more money in it than I supposed." Then the other man said, "I will tell you what I will do. You can take your choice of any three cows in my herd for that cow." But he said, "I would rather feed and milk that one cow than feed three of your cows to get the same profit." I have seen a lot of men who said, "I milk my own cows, and I know which is my best cow"; and I have heard some of their bluff called, and I have seen them tried out, and I have never seen a man yet that could guess anywhere near which was the best cow.

I am selling on the flat rate, and there never was a bigger swindle perpetrated in God's world than selling at that rate. There is just as much sense in paying the same price for 4½ per cent. milk and 3½ per cent. milk for cheese purposes or any other purpose as there is in paying the same price for shrunken wheat as you pay for plump wheat. I am selling on the flat rate, and I keep cows that do not give too rich milk, and the man that puts in 4 per cent. milk for the same price with me on 2 per cent. or 3 per cent. milk is getting buncoed. I have two cows standing side by side, giving the same amount of milk within a few pounds, one testing 2.8 and the other 4.4 per cent., and if I were selling on the flat basis I could tell by the looks of these cows when one would be losing money for me and the other making a profit. Why don't you organize Testing Associations, and know what your cows are doing? One man said, "Supposing I find out they are all poor, what would I do?" The University of Illinois started to get some data along this line, and they agreed to take so many farms and do the testing. They went to one man and asked him if he would let them test his cows, and he said, "Supposing they are all poor, what will I have to feed, my corn stalks and my other feed?" If you are afraid of the dollar per cow that you may have to pay there is no hope for you in this world nor in the world to come, because no man ever made a bigger mistake in this world than the failure to make a little investment in order that he might be a little more successful next year than he was the year before. How do you expect that the children that come after you are going to be better dairymen, or to reap a greater reward for their toil, unless you adopt some system to get better conditions. No man ever made a better investment in time or money. If we keep the heifer calves from the best cows and make cows of them, we are sure to have better cows than you have now. If we keep the heifer calves from the poor cows, how can we expect to come to a better state in the future? I have to thank you for your giving me such good attention. (Applause.)

COMMERCIAL FEEDING STUFFS ACT.

By Robt. Harcourt, O.A.C., Guelph.

During the last session of the Dominion Parliament, an Act known as "An Act Respecting Commercial Feeding Stuffs" was passed, which became operative on the first of January last. It is important that dairymen, who are the chief buyers of the mill by-products referred to in the Act, should make themselves familiar with its terms, in order that they make intelligent use of the aid it affords them.

The need for such an Act has been felt for some years. This is because an ever-increasing number of comparatively new and untried feeding stuffs, principally mill by-products, have been offered for sale. Most of these are valuable additions to our list of cattle feeds, and are the residues from the manufacture of some specific product from the crops of the farm. They contain all the food constituents commonly found in fodders, roots, grains, etc., but in different proportions. Most of these mill by-products, including linseed meal, dried brewer's grains, gluten meal, gluten feed, and the various kinds of bran, middlings, etc., are very much richer in protein than the original seeds or grains, because the substance extracted from them consists of fat, in the case of the first two, and of starch or of products rich in starch, in the case of the others, thus proportionately increasing the protein in the residues. For this reason, all of these by-products have been found to serve an excellent purpose in building up rations; they are generally palatable and healthful, and, if judiciously used, do not contribute any undesirable qualities to the products, beef or milk. Besides, they possess the further advantage in that, in many cases, the cost of the ration is reduced by their use. Their intelligent purchase and economical use, however, require that the purchaser shall possess a definite knowledge of their composition.

The following table gives the composition of the more common grains and some of the by-products derived from them which are now on the market:

——	Nutritive ratio.	Moisture.	Crude Protein.	Crude Fat.	N.F. Extract.	Crude Fibre.	Ash.
Flax Seed	*1-4.7	5.0	22.6	31.3	29.3	4.9	6.9
Linseed Meal	1-2.3	9.0	30.4	7.1	37.0	10.6	5.9
Barley	1-9.0	14.3	10.6	2.1	66.0	4.5	2.5
Barley Dust	1-4.6	10.6	14.0	2.2	55.9	13.9	3.4
Brewer's grains	1-3.3	76.2	5.1	1.7	10.7	5.1	1.2
" " (dried)	1-3.3	9.5	20.6	7.0	42.3	15.9	4.7
Corn	1-9.7	11.0	10.4	5.1	70.0	2.0	1.5
Gluten Meal	1-2.2	6.8	34.9	6.9	49.6	1.1	.7
Gluten Meal	1-5.0	5.6	17.7	7.4	62.3	6.2	.8
Corn Bran	1-11.4	6.0	8.6	2.0	64.9	16.3	2.2
Wheat	1-6.7	13.4	12.0	1.9	69.0	1.9	1.8
Wheat Bran	1-4.6	10.4	15.0	3.7	57.1	8.7	5.1
Wheat Middlings	1-4.7	10.1	15.5	3.9	62.5	4.3	3.7
Oats	1-6.5	13.0	11.3	5.4	57.3	10.0	3.0
Oat Hulls	1-15	8.7	7.6	0.5	48.5	28.6	6.1
" Hulls	1-85	5.3	1.5	1.0	51.1	35.5	5.6
Peas	1-2.8	14.0	22.5	1.6	53.7	5.4	2.8
Pea Bran	1-8.7	7.5	10.0	1.4	36.1	42.1	2.9
Alfalfa Hay	1-4.8	8.4	14.3	2.2	42.7	25.0	7.4
Clover Hay	1-5.3	15.3	12.3	3.3	38.1	24.8	6.2
Timothy	1-14.7	13.2	5.9	2.5	45.0	29.0	4.4
Oat Straw	1-31.5	14.5	4.0	2.0	37.0	36.8	5.7
Corn Silage	1-15.6	79.1	1.7	.8	11.1	6.0	1.4
Turnips	1-10.6	91.5	1.0	.2	5.7	0.9	0.7
Mangels	1-12.8	87.0	1.0	.1	10.2	0.8	0.9

*Figured from total food constituents.

Notice how the extraction of fat from flax seed leaves the by-product, linseed meal, or oil cake, richer in all the other constituents, giving us a food exceptionally rich in the muscle forming substance, known as protein.

In the case of the brewer's grains, the malting process to which the barley has been submitted has changed starch into sugar, which in turn has been separated from the malted mixture and, consequently, the product is richer in protein than the original barley. Corn is a starchy grain and is used to prepare starch for laundry and culinary purposes, and to prepare glucose and corn syrup. Corn is also comparatively rich in fat, and sometimes this is separated from the germ giving us corn oil with corn oil-cake as a by-product. Thus, from corn we have four by-products—gluten meal, a material which contains a very large amount of protein; corn bran, the outer covering of the corn, a comparatively poor food product; corn oil-cake, germ of the grain minus the greater part of the fat, but rich in protein; the gluten feed, which is a mixture of gluten meal, corn bran and corn oil-cake, or all the by-products of corn left in one feed.

The making of flour from wheat leaves a by-product largely composed of the outer coverings of the grain, and, consequently, more fibrous, and containing more protein, because this constituent is found in largest quantities immediately under the bran layers. Oat hulls are comparatively easily and completely separated from the oat kernel and form a product which has a very low food value. Further, it is evident that there is considerable variation in the composition of this product.

Another thing that has added to the difficulties of intelligently purchasing these products is the tendency of the manufacturers to mix various by-products and offer them for sale under a trade name that gives no clue to their probable nutritive value. These mixtures may be, and frequently are, very desirable feeds, but the buyer cannot form a correct idea of their value unless he knows the amount of protein, fat and carbohydrates they contain, or has proved their value by feeding trials.

There is also a tendency in some cases to mix low-grade by-products with those the farmer is familiar with, as, for example, oat hulls with wheat bran. With this condition of affairs, it is evident that the purchaser of these valuable by-products cannot form a correct idea of the probable composition or value of feeds from the name they bear. The object of the Commercial Feeding Stuffs Act is to aid the farmer in the intelligent purchase of these feeds.

This Act provides that no commercial feeding stuff can be legally offered for sale in the Dominion of Canada until it is registered with the Inland Revenue Department. It is then given a registration number, which, together with the guaranteed per cent. of protein, fat and fibre, must be affixed by the manufacturer, or agent, to every package of commercial feeding stuff sold or offered for sale. The statement required is as follows:

1. Name of Brand.
2. Registration Number.
3. Name and address of Manufacturer.
4. Guaranteed analysis.

This may be either printed on the sack, or a printed tag bearing the required information may be attached to the package.

Experience has proved to the Department that the name of the brand on a material is not enough for identification purposes, for more than one feed may be sold under the same name. Consequently, it was thought advisable to give each feed a registration number, which number must always appear on the goods, and, of course, could only stand for one feed. The guaranteed analysis does not call for the full percentage composition of the feed, but for the minimum percentage of protein and fat, and the maximum percentage of fibre. A knowledge of the amount of the latter constituent is important as this material is very indigestible and its presence decreases the digestibility of the other constituents of the feed.

The Act defines a commercial feeding stuff as follows:

"Commercial feeding stuff," "feeding stuff," and "feed," mean any article offered for sale for the feeding of domestic animals, and feeds claimed to possess medicinal as well as nutritive properties, excepting only hay and straw, roots, the whole seeds or the mixed or unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat or flax seed; wet brewers' grains; the bran or middlings from either wheat, rye, oats, peas or buckwheat sold separately and not mixed with other substances."

It will be noticed that whole seeds or the mixed or unmixed meals made directly from certain grains are exempted, as are also bran and middlings from either wheat, rye, oats, peas or buckwheat as long as these are sold separately and not mixed with one another or with other substances. There was no desire on the part of the framers of the Act to in any way hamper trade in these commercial products. Therefore, these common, well-known products that are sold in large quantities locally were not included in the Act. It is recognized, however, that fraud has been practised in the mixing of oat hulls with wheat bran, and that meal from mixed grains may be adulterated. To check this without putting the manufacturers to the inconvenience and expense of stamping the composition of the package, it was decided to deal with the adulteration of these products under Section 26 of the Adulteration Act. With the object of determining a fair standard composition, the Chemist of the Inland Revenue Department collected and analyzed 541 samples of bran, middlings, and mixed feed or "chop," or Moulée.

The results of these analyses are given in Bulletin No. 191 of the Inland Revenue Department.

To show the variation in composition found in these products, I quote the following figures from the Bulletin, which give the extreme and main results of the analyses:

Bran: 148 samples analyzed.

	Maximum.	Minimum.	Mean.
Moisture	13.37	7.90	10.69
Fat	9.52	1.42	3.92
Proteids	17.56	11.81	14.67
Crude Fibre	13.20	3.96	9.26
Ash	7.16	3.16	5.53
Carbohydrates	64.25	50.06	56.01

Shorts or Middlings: 258 samples analyzed.

Moisture	13.56	6.45	10.54
Fat	6.88	0.95	4.04
Proteids	18.93	10.00	15.25
Crude Fibre	12.15	0.22	5.63
Ash	5.74	0.88	3.63
Carbohydrates	74.18	51.04	60.55

Chop-feeds: 135 samples analyzed.

Moisture	13.92	3.05	10.38
Fat	11.75	0.87	3.09
Proteids	16.19	6.63	10.70
Crude Fibre	25.80	1.21	8.69
Ash	7.64	1.04	3.24
Carbohydrates	74.59	47.89	64.45

There is nothing to hinder the manufacturer of these products guaranteeing their composition as required for other foods in the Commercial Feeding Stuffs Act. In fact, the Chief Chemist strongly recommends the manufacturer of chop feeds, *i.e.,* feeds made from mixed or unmixed grains, ground or unground, to register such feeds and sell them under a definite guarantee.

In case bran, shorts and chop-feed are sold or offered for sale without a registration number, and without a special guarantee from the manufacturer or agent, the Chief Chemist recommends that the following limits be made legal:

	Crude Protein (Not less than)	Crude Fat (Not less than)	Crude Fibre (Not more than)
Bran	14.	3.	10.
Shorts	15.	4.	8.
Chop-feed	10.	2.	10.

With reference to the above standards, it is important that the three constituents be considered. Recently, a sample of bran was sent in for examination which was found to contain more than the standard amount of protein and fat, and could not be considered adulterated if these were the only constituents considered; but, it also contained about 15 per cent. of crude fibre, which was one-half more than the standard allows. It is in this constituent that the addition of oat hulls would be most readily detected. It is expected that the adulteration of bran may be controlled in this way without requiring the guaranteed analysis to be stamped on the bag.

The Commercial Feeding Stuffs Act ought to be decidedly beneficial in three ways:

1. It will protect the stock feeder against low grade and mixed by-products with which he is not familiar.

2. It will protect the manufacturer and dealer against dishonest competition.

3. It will promote a more intelligent use of the mill by-products and thus directly help to bring about a more economic use of all feeding stuffs. There are some on the market that are dear at any price; others are good value at the prices asked.

It is to be hoped that farmers, dairymen, and all feeders of live stock will make themselves familiar with the terms of the Act, and so study the composition and price of the feeds offered for sale that they will be able to make the best possible use of these in supplementing the home grown roughage in producing economic gain, whether for growth, or fattening, or for milk production.

Q.—If they adulterate bran with this screening from the West would that be considered adulteration?

A.—If the screenings are brought in separately I think it would be. A great many millers contend that they should be allowed to sell anything that they are allowed to bring in. Of course, if they bring in screenings separately I consider it adulteration. Anything that is mixed in the bran would be adulteration.

Q.—Is that a Dominion Act?

A.—It is a Dominion Act. Questions of that nature are under the jurisdiction of the Dominion Government.

Q.—Does it apply to foods over the whole Dominion?

A.—Yes, just as our Fertilizers Act refers to fertilizers over the whole Dominion. My reason for bringing it up is that farmers should know that they have such an Act so valuable to them. They should pay attention to it, and not buy anything that is not stamped. The practice of mixing corn, bran, and wheat bran would come under the Act. If a man mixes them he must stamp it.

Q.—The practice of mixing Western wheat screenings would not come under the Act?

A.—I do not know about that; but we can get a ruling on that point. We ought to do everything we can to prevent the bringing in of these wheat screenings.

Q.—Do you think the Manitoba bran is equal to our bran?

A.—We do not find much difference in the composition. The harder wheats from the West are ground closer and more of the carbohydrates are taken away from the bran.

Q.—How do they compare in fibre?

A.—In general there is not much difference in composition. As a rule, the proteids are lower in the Ontario wheat and therefore in Ontario bran than in the Western.

Q.—You think the Western bran is a little better?

A.—Yes, it will stand a little higher.

Q.—Will Eastern wheat be lower in protein?

A.—The frosted wheat we find higher in proteid than the good wheat. The more mature the wheat the plumper it is because of the formation of the starch, therefore, in grain checked in its growth, it would be richer in protein.

Q.—Ontario fall wheat bran is more digestible, I am told, and that is why I asked the question as to fibre.

A.—I cannot tell you the exact difference, but there is very little difference between the two. We always find the richer the food in protein the easier it is to digest. Take it with only from 4 to 5 per cent. of protein, only 20 per cent. of that food was digested. Alfalfa hay contains about 19 per cent. of protein; 75 per cent. of the protein was digested. The higher the protein in the food the more digestible it is as a rule, and if we followed that out we would find that bran that is higher in protein would be higher in digestibility.

Q.—Does that apply to the fats as well?

A.—Not so much to the fats as to the proteids.

ANOTHER YEAR IN COW TESTING.

By Chas. F. Whitley, Ottawa.

[This address was also given at the meeting of the Eastern Association, and appears in the report of that gathering.]

ADDRESS OF WELCOME.

Dr. Guest, Mayor: It is a pleasure for me to have the privilege of welcoming the Western Dairymen's Association to what we believe to be the best city in Canada. I must, in the first place, congratulate the Dairymen's Association on the success of this their forty-third Annual Convention, and their eighth annual exhibit. You should be successful. You have the united and loyal and enthusiastic support of every dairyman and every agriculturist of the province of Ontario. Perfection in quality is what you are aiming at, and the product of butter and cheese in the Province of Ontario is such as to show that you stand second to no other in the great markets of the world. The Ontario Legislature, through the Department of Agriculture, is doing a great work along this line. They are giving schools and instructors to every part of Ontario, and this is bringing the young men and young women to learn the art of making butter and cheese. Public meetings of this kind that you have at your annual convention are an admirable thing. They are public educators. Let me say that I am pleased to see so many of the farmers with their wives, sons, and daughters of the surrounding township to-night. It shows that you are taking a deep interest in the matter, and I say this Association is a public educator. In 1904 we had the pleasure of having the Dairymen's Association meet in the city of St. Thomas, and I assure you that we are pleased to have you again in 1910. At that time we endeavored to entertain you, and to show you the beauties of our city; and now when you come back in 1910 you show that you appreciate the efforts that we put forth. At that time we did not have this beautiful building, and I say that our thanks are due to the Engineers of St. Thomas for erecting this building in which you are holding this meeting to-night. We are in a position now, that no matter how large a convention wishes to come to St. Thomas, we will be able to stretch out our hands and say, we have a convention hall equal to entertain them. In a few years St. Thomas will be looked upon as the convention city of Western Ontario. After recounting some of the advantages of St. Thomas as a desirable place to live in, he concluded by saying, "I deem it a pleasure, as well as a great honor, to extend to such a noble body of men the hand of gladness."

Mr. N. G. Hay, President of the Board of Trade: I am sure it affords me as much pleasure as it has the Mayor, and as much pleasure as it does the citizens of St. Thomas, to extend on behalf of the Board of Trade a hearty welcome to our city. There is no body of men that we have ever had in our midst that we are more pleased to have than you. The only fault that we can possibly find with you is if you do not make St. Thomas your permanent headquarters. We have a beautiful city, and you can come here and we will take care of you.

On behalf of the Board of Trade I wish this annual convention every success. I do not intend to enlarge upon the possibilities of dairying or farming in any way. I do know, however, that our export of cheese and butter runs to a considerable sum of money, and that there is no better butter or cheese than is made in this Western part of Ontario. I have been buying butter from the same man for eight years, and that ought to be good evidence that he knows how to make it. I am sure he knows how to charge for it, because last Saturday I had to pay thirty cents a pound, but I know that it is worth it.

Ex-Mayor Geo. Geddes: I am certainly pleased to be present. It was at my invitation, endorsed by the City Council, that you were asked to hold your convention here in 1910, and out of courtesy, the Council insisted that I should remain on the reception committee until your Convention was over, and I am sure that it affords me a great deal of pleasure to know your previous Convention here was so successful that you decided to come back again, and I hope that at an early date you will again come to St. Thomas. I am not going to enlarge on the work you are doing. I know you are doing good work, because I have been taking milk and butter for a great many years, and I know the manufacture has improved very much.

The Chairman: I am sure I voice the sentiments of the members of the Western Dairymen's Association when I say that we wish to thank these gentlemen for their kind welcome, and I would ask you to endorse it by a hearty clap of the hands. (Great applause.)

DAIRYING FOR PROFIT.

By N. P. Hull, Dimondale, Mich., U.S.

I have a little advantage to-night, because I am sure that in talking to my friends the dairymen and the dairymaids, I have a topic that you will all be interested in. I cannot conceive why any man should put in his time feeding cows, milking them and taking care of them, unless he does it for a profit, and my theme this evening is, "Dairying for Profit." I hold that there are three or four things that every man must keep in view, if he is to make a profit in dairying or as large a profit as he should. My subject should have been, "The Most Profitable Dairying," for it just seems to me that if we are going into this thing at all, and if we are going to put part of our life into it, we ought to put it in such a way as to get all that is possible out of it. In order to have the most profitable dairying we must make up our minds to have three things, because no man has ever made the most profit possible out of dairying without these three things. The first is good cows, and the second is that these cows shall be well and properly fed, and the third is, that they shall be properly cared for. I have had several years' experience in dairying. It has been my good fortune to go up and down the State of Michigan, and to be in all of the large dairying states, or most of all the dairying states in the United States. I have become acquainted with the leading dairymen, and I have had the advantage of getting acquainted with some of the leading dairymen of Canada, and I have not only my own experience, but the experience of the leading dairymen behind me. If you are to put your life into this business, you should put it in in such a way as to get the most out of it; and to do that you must have these three things, a good cow, properly fed, and properly cared for. It is not necessary for me to talk about the good cow to-night, because you have heard a great deal about it to-day.

Is dairying profitable? I want to look at this matter of profit in a large sense. Every man to-day, who is on a farm, whether in Michigan or in Canada, has always to keep before him two distinct propositions. First, we want to sell as many dollars worth of stuff off our farms each year as we can, which will carry with it the largest per cent. of profit possible. Does anyone want to question that? Of course you don't, because the profit you get out of your business for one year measures the value of that year of your life, and we certainly want to get as high a valuation as we can, so we all want to sell as many dollars worth as we can, carrying as large a percentage of profit.

The next thing that every farmer should keep permanently before him is that he should maintain or increase if possible the fertility of his fields in order that the next year and the year after he may continue to sell more dollars worth of stuff which will carry with it a larger per cent. of profit. There is not one here who wants to take issue with me upon that proposition.

Will dairying enable us to sell more dollars worth of stuff which will carry with it a large per cent. profit? I do not believe there is any animal upon the farms of Ontario or Michigan to which we can feed our crops that will turn it into as many dollars worth of produce with as large a per cent. of profit as will the cow. There has not been a year in the last sixteen upon my farm in which I could not have gone upon the open market and bought every dollar's worth of stuff I feed to my dairy cows, when these cows would not have paid for it and paid me a good liberal profit on it; and this is the only line of live stock I have handled on my farm for sixteen years that is able to do it every year. Dairying is the only line that I have ever tried that would enable me to turn a good liberal profit every year. I have nothing against the steer, I have nothing against the hog or any other animal. I have bred and raised sheep, I have fed steers by the carload, and I have fed a good many hogs, and I have got some profit. But let me make a fair comparison. Supposing you and I upon our farms have grown a certain amount of feed. We will call it a unit of feed, enough that we might take it and feed it to a two-year-old steer, enough to make him dress one pound more. What is a pound of dressed beef worth? I suppose it will run somewhere from five to fifteen cents a pound. If instead of feeding that to the steer you feed it to the dairy cow, she would have converted it into a pound of butter worth twenty or thirty cents at least. Some one says there is more labor about the pound of butter, and that is true; but the difference in the cost of production is nowhere commensurate with the difference in the value of the profit. Three pounds of good milk furnishes the equivalent in digestible nutrients of a pound of beef steak, and it will be produced for a third of the cost. Another proposition. When I was a boy four years old my father died, and I was the eldest of the family. We were left in a little log house upon a little farm, and it was in debt, and we were in debt until I came of age. My brother and I, who is two years younger, cleared off that debt, and then being ambitious young fellows, we bought more land and got further in debt, until I have been in debt clear up to my neck. But I never laid awake worrying for fear the interest would not come due, and I never laid awake nights for fear the tax-gatherer would fail to call upon me; but I did have to lay awake once in a while worrying to know where I was going to get the wherewith to meet these demands. I wanted some business that I could tie to, that would give me a surety in regard to the income and outgo. I wanted to come as near insuring an income as possible, to meet these sure outgoes. I looked all over the field and decided on dairying, and I want to ask you, my friends, what kind of work can you show me upon the farm that eliminates the possibility of chance and speculation as dairying?

Take the hog. We start with a bunch of pigs to-day, and we keep them until they are six or eight months old, before we put them on the market. We know they are eating good food, but we do not know whether, when they are ready for the market, that they will bring enough to pay for that feed and give a profit besides.

Take a steer, if you like. Start out with one and you are going to keep him until he is two years old. You are feeding him good feed; you are doing a credit business with that steer. He will pay his debts if his carcass will yield enough to enable him to liquidate. But supposing he does not, then you are buncoed.

If I was at home to-day I would go along that alley of cows. Have I got to wait, as I do for a pig, for six months, to know whether I am going to get my pay? Or with a steer on a credit business for two years? No. In the dairy business fifteen minutes after I have fed those cows along that alley-way I step around to the business end of the cow and draw my pay from it. I will do that twice a day. Can you point me any other line of business that pays up twice a day? The nearest you can come to it is the old hen, but I never knew one of them that was willing to pay more than once a day. (Laughter.)

I was over in Southern Michigan talking at a Farmer's Institute, and I made the observation there that my cows a few years previously had paid me an average of $2 for every dollar's worth of feed. The next day they had a poultry session and a young fellow got up and said, "Hull stated that his cows paid an average of $2 for every dollar's worth of feed, but I can go him one better. My hens paid me $3 for every dollar's worth of feed, and I was not tied to a cow's tail, either." He went on with his talk and some one finally said, "Mr. Brown, were you ever troubled with roup?" and he said, "Yes, we have had roup." Then they asked, "Do you think it is contagious?" He said, "I know it is, for when my fowls had roup, my wife had the same symptoms, and I am sure she caught it from the fowls." "Were you ever troubled with lice on your fowls?" He said, "Yes, I have been. It was only about six weeks ago when I felt something crawling on my neck, and my wife said, 'What's that? Why, that is hen's lice!' and I got out there and got after them right away." After he had said this, I concluded that if my wife had to get the roup and I had to be lousy, I would stick to the cow's tail. (Laughter and applause.)

Dairying is profitable. I just want to give you an illustration of profit in dairying. I was in Ohio last year doing Institute work, and the President said to me, "We have one of the best dairymen in Ohio," and he brought him around and introduced him as Mr. Stanley. I asked, "What are your cows doing for you?" and he said, "Here are the figures." The largest producing cow was giving over 14,000 pounds. I have had cows that would do better, but the remarkable thing is that the lowest producer yielded over 10,000 pounds of milk. He sold to the cheese factory, and his average for nine months in the year was $160.14 for the milk, and his feed bills were a little over $55. Now this is about as good as I ever heard, where the man sold to the cheese factory, or at the ordinary wholesale price of milk.

That man started twenty years ago with one cow, and he knew how much that cow gave, and he kept a record of every cow he has since that day, how much milk she gave night and morning. That man tested every heifer, and if she gave milk enough, she stayed on his farm, and if she did not, she got off his farm; and he has got about him a herd of cows that yield him an average of $160.14 of milk, and his calves sell at a young age at $59 each, which makes an income per cow of $219.14, for a feed bill of $55 and a little over. Therefore, I say, my friends, dairying is profitable if you do the right sort of dairying.

I have told you the best thing to do, and now I am going to tell you the other side. Over in Michigan, I went about one factory and I inquired of every patron the number of cows they had, and asked them to find out how much they fed their cows, and I looked to see whether they had decent barns in which to keep their cows. I wanted to find the average conditions. I went to the factory and asked them to let me see their books, and I figured them up to see how much money they had paid each man. I divided each man's money by the number of cows he had, and I found that the lowest man received $22 per cow. That is all he received, and I found when I turned over how much it cost to keep his cow, that for every dollar's worth of feed given to the cows they returned him 76 cents. I have said to you that dairying is a good business, but here is a man who put in his time growing feed that he could have sold on the local market for a dollar, but instead of doing that he fed it to the dairy cows and that lowered the value down to 76 cents. There was another man at that factory who was getting $79, and I found for every dollar's worth of feed he fed his cows they returned him $1.95 for it. These men live just exactly a mile apart, and delivered their milk to the same factory, yet one man only received $22 and the other $79 per cow. One man put enough intelligence and brains into his business to make a success, the other man did not; and I say to you if you do not care enough to make a success of your business and put a little intelligence into it, then don't go into dairying. I cannot see why a man should be willing to feed and milk these cows twice a day, and be there on the ground 365 days in the year unless he gets something to show for it.

To get the most possible out of business you must put some intelligent, painstaking care into it, and if you are not willing to do that then don't go into dairying; or if you are in it get out of it.

Over in Michigan I had some real good men who would take their Bibles and sit down on a Sunday morning and read over that good old story of Pharaoh and the children of Israel, and how that mean fellow insisted upon the children of Israel making bricks without straw, and the injustice and cruelty and tyranny of that thing, when Pharaoh insisted on his servants doing a thing that he knew could not be done. These same men turn around and condemn their cows because they do not give them profit, when they have demanded of her exactly the same thing that Pharaoh demanded of the children of Israel. It is too much like trying to make bricks without straw. It is not possible for a cow to give a profit if you do not give her proper feed. The question came up here to-day whether it paid to feed intensively or not. I have a little experience in that, and I will give it to you. When I commenced dairying I kept track of the cost of the feed, and when I first commenced it cost about $30 a year to feed the cows, and I got about $40 of milk per cow, so I was making $10 per cow profit. I thought there were a lot of men making more money than that per cow, and I wanted to make more. In fact I had to make more. I do not know that any of you will get caught just as I did. But I had to make a success of that business.

I took a notion to a certain girl, who was teaching in the neighborhood, and I told her of it. She was from Missouri, and she said to me, "I am getting $50 a month teaching school in the city, and I do not care to go into partnership in any business that is not worth $50 a month," and it was up to me and I had to show that "school ma'am" that partnership in my business was just as good as $50 a month teaching school in the city. And there was just one thing for it: these cows had to give more milk and show more profit, or else the school ma'am was not mine; and of course it goes without saying that they gave more milk. (Laughter and applause.) I made some inquiries and investigations and experiments, and I found that it took $20 worth of feed, as feed ran then, just to maintain the cow. I had a thousand-pound cow on the first day of January, and she ran dry, and for a year did not give any milk, and I kept her for that year and it took $20 worth of feed to keep her. I found that I was $10 out on that cow that year.

I also learned that a cow ought to be fed regularly at the same time every day, and I found that to enable that cow to do her best she must have a variety of food and she must have palatable food. I found that everything about the manger and the barn must be kept sweet and clean, if I was going to keep that cow up to the maximum capacity. After I learned to feed that cow regularly, to feed her a variety of food and to feed her palatable food and keep everything clean about the barn, I got her to eat $40 worth of feed. These are exactly the figures that we worked out in my own dairy. When I fed $30 worth of feed and got $40 worth of milk, I made $10 per cow. But when I got them to eat $40 worth of feed and yield $80 worth of milk, I made $40 per cow profit, or as much in one year's dairying as I made in four year's dairying. Take any sort of machinery that you and I ever ran and made a success of. Did you ever run it on any other principle except running it to the maximum—running it up to its full capacity? Every man who is running a machine knows he must run it up to its full capacity in order to make the most profit, and the same thing is true with a dairy cow. I know that you can feed a cow too much, but you are not doing it when you are running the machinery up to the full normal capacity. I can find hundreds of men over in Michigan who are lying awake at night multiplying contrivances to get their cows to eat less, when they ought to be trying to get them to eat more. The average three years ago was $27 per cow. That meant that a man puts in $27, $20 of which runs the machinery and $7 to be converted into milk, and then he condemns the cow because he does not make any profit. Making "bricks without straw," no question about it. He does not furnish her enough feed.

Feed regularly. Why? The cow will be better if fed regularly. While we were in the habit of feeding at a certain hour, if some event came along that put that off we could depend upon it that out of 50 cows we would drop from 40 to 60 pounds of milk. We feed just as much, but we lose that 40 or 60 pounds out of the profit, and we cannot afford to do it. Therefore we try to be regular in feeding cows.

Have a variety of feed. Why? Because the cow will do better upon a variety of feed. I remember being once in Allegheny County. I had been there six years hand running in Institute work, and had been advising men to build silos. A man came to me and said, "Hull, I have been hearing you at this Institute for over five years, and always hear you recommending to build silos. I built a silo and fed my cow silage, and although I am geting a little more milk to-day, my cows do not look as well as they did before I had the silo." I said, "What are you feeding your cows besides silage?" "I am not feeding them anything else," he replied. "Well," I said, "did I ever come down here, my friend, and advise you to build a silo, and then just feed your cows silage?" He said, "No, I do not think you did; but you said silage was awful good food." I said, "It is. Well, my friend, don't you like fresh pork?" and he said he did. "And it is a good food?" and he said, "Yes." "Well, then," I said, "in the name of common sense, when you are butchering, why don't you get your wife to feed you fresh pork, morning, noon and night, until your pork is gone? That is the principle you have adopted in feeding your cows." Well, of course he knew right away then that he had done wrong. Although we all like fresh pork, if we had to eat it morning, noon and night, we would not care much for it. We all like a variety of food, and so does the cow. It encourages the cow's appetite, and she will eat more.

The next proposition is to feed her palatable food. We hear a great deal about balanced rations. The balanced ration is all right; it is nothing but common horse sense. It is simply furnishing a cow with the material she must have to run her machinery and make milk. If I could have a palatable unbalanced ration, as compared with an unpalatable balanced ration, then I would take the palatable ration every time. The longer I study dairying, and the longer I feed cows, the more I am satisfied that there is no one attribute to a ration that begins to be so valuable as that one attribute of palatability. Get feed that will taste good to the cow, and she will digest it better and feed better and do better work, and pay you larger profit. I am satisfied that the benefit silage gives is largely from its palatability. Professors of chemistry have made experiments, and they cannot find more digestible nutriments in the silage than they can in the field corn. And I am satisfied that a large part of the value that comes from silage is that the cow likes it so well.

I have been laughed at in Michigan because I have a covered barnyard. We simply took the fence away from the barnyard, put up a stone wall around and built a big building 80 by 90 feet, with matched siding and a good shingled roof and a cement floor, and from the time the cows come in from pasture until they go out to pasture in the spring they are never exposed to the weather. We turn the cows into the covered barnyard in the morning, and then ensilage is thrown down, and the stable is cleaned, and the silage put in the mangers, and then as soon as you begin to mix that ensilage to make it smell, you will see these cows stand up, ready to be invited in. And I have seen the saliva dropping from their mouths; I have seen it running in a stream from their mouths. What does that mean? It means that their mouths are watering; there is no question about it. If a man does a good steady day's work and is healthy and gets good and hungry, if he thinks of something to eat his mouth will water. These glands that exude that saliva are controlled by the great sympathetic system of nerves, and when it excites these glands, it also excites the glands of the stomach and the intestines. I have talked this over with professors of agricultural colleges, and they agree with me. I am thoroughly satisfied that the cows will digest it better because it is palatable; and I use it more, and it puts more milk in the pail, and it makes me more butter.

We not only want silage, but we want hay, either clover hay or alfalfa. What is it that makes that palatable? I could take any one of you farmers to a mow of clover hay blindfolded and you will tell me whether it is good hay or not. You run your hands in and get a wisp of it, and if it has the right aroma, you will say, "This is good hay." Don't you think that a cow that has been in the hay business all her life knows as much about it as you do? You should get it cut early before it gets too much crude fibre in it.

I commenced farming when I was fourteen years old. I said to a neighbor, "Is it not time to cut the clover hay?" He said, "Not yet, my boy." I asked him when I was to cut it, and he said, when two-thirds of the heads were brown. I asked another fellow. I said, "Do I wait until two-thirds of the clover heads are brown?" and he said, "No, it will be too ripe. You ought to cut it when an odd head is brown." I asked another old gentleman. He said, "You want just one brown head in the field, if you want the best yield, and you want that brown head to be on the shoulders of the boy riding the mowing machine." And that is about right. You should cut that hay when it is in full bloom, cure it well, and when you put it before the cow she will eat it.

It is not necessary to say anything about the desirability of keeping things clean and sweet.

I do want to say something in regard to the care of the cow. I have travelled over this country as well as over other countries. I saw evidences in this country, as I saw in Michigan, that you do not keep your cows as comfortable as you should. They should be quartered in well-lighted and ventilated stables. We hear a great deal about tuberculosis among cows. There is a lot of it. Why? I fancy a very large amount of it comes from the fact that they are kept in farmers' barns that are poorly lighted and ventilated where you would not think of keeping your families. There is nothing that is more healthful than the direct rays of the sun, and there is nothing that will kill off germs more rapidly than the direct rays of the sun, unless it may be strong chemicals. Then have your barns well lighted and ventilated and keep the cows comfortable, which means keeping them warm. Over in our State I was driving along with a gentleman who came from Canada, one cold, bleak blizzardy morning, and we saw a herd of cows running around a straw rack. This Canadian farmer looked at the cows, and then looked at me, and he said, "Well, friend, there is a man's advertisement, and the barns and the rickety buildings and fences; there are the results of his business methods." You can put it right down as the first principle of this business that if your cows are running out when it is cold and disagreeable, you are advertising a system of dairying that is bound to lead to poor results. Many a man has come to me and said, "Well, Hull, it is all right for you to talk. We all know that you have great bank-barns and covered barnyards, but we cannot do that." And I say to them: "I would never have had that bank-barn and covered barnyard if I had not made conditions right, so that the cow could make profit enough to allow me to build a bank-barn and a covered barnyard." I commenced in a little shed leaning up against a little barn. The building paper was cheap enough, so that I could make that little shed warm, and it is cheap enough to-day, so that any man can afford to make his stable comfortable. Window lights were cheap enough then, and they are cheap enough to-day. No man is so poor that he cannot give his cows plenty of fresh air. If you cannot put in a modern system of ventilation, borrow your neighbor's saw or axe and make a hole in the barn and tack over it 5 cents worth of muslin, and that will provide for ventilation. It is not the best system in the world, but it is away ahead of nothing. Then get your cow and feed her properly, and she will give you good profits. Don't ask the cow to make bricks without straw. Get a good cow and feed her. She ought to have enough to eat to run the machinery, and then furnish that machinery with all the food it can take. See that you are giving her all that. See that you are doing your part, my fellow-dairymen, towards making it possible for the old cow to do her part. Then furnish her well-lighted and well ventilated quarters, and there is no animal that ever roamed over these fertile fields of Canada that will do more to help her owner, and enable him to put more money in the bank than will that good dairy cow. (Loud applause.)

THE CHAIRMAN: It affords me a great deal of pleasure to introduce to you a gentleman from the eastern part of the Province, who has just vacated the office of President of the Eastern Dairymen's Association of Ontario.

ADDRESS.

By JOHN R. DARGAVEL, M.P.P., ELGIN.

Your President has said that it affords him much pleasure to call upon me to address you. I am sorry that the pleasure is not reciprocated. Although I have been some time in public life, I have never acquired the art of speaking as I would like to, and I always feel a little nervous when I face an audience of this size, and judging from the faces here you are an audience of much intelligence. I am here to-night only to bring a message from the Minister of Agriculture, the Hon. Mr. Duff, who was unfortunately unable to be present on account of Cabinet duties preventing him from leaving Toronto. He was with us in Belleville last week, and he said that, if possible, he would like me to come to-night, as he said his duties would prevent him from being with us. We were very glad to have the Hon. Mr. Duff with us last week, he gave us a splendid address, and we gave him a good reception. We were glad to do so because we feel that we owe Mr. Duff as Minister of Agriculture, considerable gratitude for the liberal way he has acted with us at all times, and I am sure your President and Directors will bear me out in this, that any time we have gone to Mr. Duff looking for any changes in our sanitary laws, or anything pertaining to dairying, or to ask for any grants, he has always treated us very generously. He has always been our friend as the two Ministers of Agriculture who preceded him were our friends. We have been very fortunate in that regard, we had Hon. Mr. Monteith, and prior to him, Hon. John Dryden, who was always ready to listen to our claims and to help us in every way.

I will not pretend to instruct you, because you have experts here in every line, and you have already had a good practical address. We have sent from the east some men who, I am sure, will be able to give you some advice and information along technical lines. We have with us a gentleman who is the Chief Instructor for Eastern Ontario, Mr. G. G. Publow. We have also an able gentleman here, formerly your Chief Instructor, who is now engaged at Ottawa, Mr. Barr, and who will tell you how to take care of your milk. I bring you greeting from the dairymen of Eastern Ontario. We are not blessed as you are in the west with such a beautiful fertile country. We have mostly rough broken land, particularly adapted for dairying, but not adapted for grain, and consequently we have gone more largely into the dairying industry than you have in the west. In fact, we were forced to do so. Years ago we had to give up growing grain, and as you have a much finer country than we have perhaps your climatic conditions are also better than ours. Yet there is one thing that I will undertake to say, that we cannot excel you in raising, and that is we have very few mortgages on our farms in Eastern Ontario, and this state of things has risen from the fact that we have been in dairying for so many years that the old mortgages have been paid off and 95 per cent. of our dairymen to-day are prosperous. But we have not arrived at that state of excellency that we would like, by any means. We are just beginning to find out how much chance there is for improvement. They say when a man finds out that he does not know everything there is some hope for him then. We are finding out that we can make more improvement along the line of caring for our stock, and that we have a chance to make great improvement in the sanitary conditions of our stables, and that we have a chance of making improvement in the building of our cheese factories. We are mostly in the cheese business. We have not a great many butter factories or creameries in the east. We have made wonderful progress, and I am sure you will be glad to hear that we have made great improvements in our factories in the last two years. Mr. Publow will be able to tell you of the thousands of dollars that have gone in our factories in the last year, and that has been going on steadily now for some years. Evidently the Sanitary Act that was passed a few years ago has helped us along these lines. We have on the road in the east 24 Instructors who are engaged all the time in looking after the factories in our jurisdiction, in addition to the Chief Instructor. These men are busy on the road all the time, and they are doing first-class work. We are all interested in the excellence of our product. We want to see you in the west turn out the very best cheese that can be made, and I am sure you have the same wish for us. We feel that we are justly interested in the quality of goods you turn out as well as the quality turned out in our section. When our cheese goes to England, it is sold there on its quality as Canadian cheese, and it is on the general quality of that that the price is fixed. That is one reason why we employ these instructors and send them around through the country, so that we will make a uniform article in every factory, and when it is placed on the English market it will be of the best quality. From the report that we have from our instructors there is a steady improvement being made along these lines. We are producing a good article in the east, and I am sure under the able instruction of Mr. Herns, of whom we have heard in the east, you are making steady improvement. I have also brought a message from your representative in the Legislature, Mr. Macdiarmid. I left him this afternoon at Toronto. He was busy engaged in completing his labors on the Milk Commission, and he hopes to be with you to-morrow night. I wanted to come west to see what kind of a constituency Mr.

Macdiarmid had, and I am very well pleased. I might say something to you along the educational system that we have, but I won't go into that as I know you are anxious to hear the experts who are here to address you.

The Chairman: I wish to pay my tribute to the last speaker. We feel here in Western Ontario that we have in Mr. Dargavel a very able man, who has at all times assisted the committees who have gone to the House to appeal to the Minister. Mr. Dargavel has always worked in unison with us. He has been a very able man and of great assistance to us in our requests, and it is only due to him that we should show our appreciation of his serices. I am sure I voice the sentiments of the Western Dairymen's Association, when I make these remarks.

ADDRESS.

By C. C. James, Deputy Minister of Agriculture, Toronto.

I was wondering when you were applauding and encoring the very fine music you have had, why we were not inclined to encore speakers, and compel them to repeat their speeches. Perhaps it is because the singer is able to get a little further into our being somewhere, and is able to reach spots that the best speaker cannot touch. He is able to stir our feelings, and we like to have our feelings touched, we like to be stirred, we like to be stimulated. It seems to me there is just a little lesson in that, in regard to dairying, fruit growing, live stock work, or farming in any of its aspects. In fact, in any line of work that we may take up, if we can only get our feelings aroused in this work everything will go all right. The first speaker came up to that point and illustrated it, and if we can only get our feelings going properly in connection with this dairy business, there will be no question about the general success of dairying in Ontario, and the individual farmer will, to a large extent, succeed with the dairying just as he gets his feelings aroused by the business that he is engaged in. If he is indifferent, and has a don't-care air about him, and does not keep in touch with the market, and does not take any particular interest in the kind of animal that he owns or the kind of feed that he is feeding, or the care that he gives, you know exactly what will result.

Here is another man, who is kind and attentive. He puts not only his brains into the business but his feelings also, he has his interest aroused, and no matter what may be his start or what may be his handicap, or what may be the difficulties he is likely to encounter in connection with his work, if he has only got his feelings aroused you know very well he will come through all right in the end.

In the month of August, this summer, I took a short run down from London to Bristol, and a friend there who was taking some little interest in me and my work suggested that we take a trip through the county of Somerset. I accepted his invitation, and we got into a fine automobile and took our route through the county over the finest roads that I suppose are to be found anywhere in the world. Gradually we began to climb a hill until we were up at the top, where the air was clear and the outlook fine. One felt like drawing deeper breaths of air, and we began gradually to go down the other side, and the road went in and out, and the cliffs became higher, and at last we were going through a gorge with piles of slate rock rising almost sheer on each side. We passed by a great crevice in the rock, and that was pointed out as being the place where Toplady took refuge in the great storm, and while there composed the hymn, "Rock of Ages." And then as we came out in the widening of the valley, there was a beautiful little village, and I do not think that I had my feelings more stirred during the three months I was away than when I stepped out and walked up and down and in and out, because I was in the old village of Cheddar. That meant something, and I thought of the Cheddar cheese of old England, and the Cheddar cheese of Canada, and I shall never forget the impressions that came over me as I stood there in the place where Cheddar cheese originated, and that gave name to that industry, which means so much for this country. Of course the cheese industry is disappearing from old Cheddar. They are doing a little dairying here and there, and the old original glory of that place has departed; but the beauty of the place and the associations well repaid me for visiting it even under circumstances which perhaps may have taken me elsewhere.

I had a letter of introduction to the manager of the Aylesbury Dairy, and I went over and presented it. I spent three or four hours going over that institution with the manager and his assistant, and I want to give you just briefly a few points in connection with the work of the Aylesbury Dairy in England. The milk, which is largely produced for city consumption, is drawn mainly from the county of Cheshire. Cheshire cheese suggests itself. A farmer up in Cheshire thinks he would like to supply milk to the Aylesbury Dairy. A form is sent to him and he is required to fill it out. If you look over that form you will find that, before negotiations are entered into at all, that man must give a full description of himself, his family and people living or working upon his farm, the class of buildings, the number of cows, their condition, and general style of the farm, and the water supply—a little more than what we ordinarily imply by the water supply, in this country. They have got to know just what kind of water is given to the cows to drink, and also what kind of water is used in washing the dishes. I want to impress upon you the thoroughness with which everything is done from start to finish. If this application looks favorable, a veterinary is instructed to go out and report upon the health of the animals, and a long report is sent in. And then the local medical health officer is sent to make a report upon the man and his family and the general neighborhood, and a long report is sent in by him. Then samples of the water are sent in, and an analysis of the water that is used for drinking and also the water that is used for cleaning the milk tins and cans, and if these three reports are favorable—that of the veterinary, medical health officer, the chemist or analyst—then, and not till then, is a director ready to start business with that man, and a contract is entered into. The supplies come in regularly every month, and the veterinary goes to that farm every month and looks into the health of the animals, and if one is at all suspicious out that animal goes. Then along comes the medical health officer every month, and reports upon the health of the people. Well, you say, supposing measles or scarlet fever or any disease breaks out, what happens? At once the milk supply is shut down. Not one can of that milk goes up to London to the headquarters, and the man who owns that farm, who supplies the milk, does not lose one dollar. Don't you see it is to the advantage of that man to be honest and straightforward? He doesn't lose anything because of an outbreak of sickness on his farm. The company say to him, "You be fair to us and we will be fair to you, and so long as there is any reason, whether sickness in your family or an employee upon your place, you will not stand any loss."

Samples of the water are sent up twice a year to be analyzed, and the milk comes to the headquarters with a guarantee that it is coming through a safe, sanitary, reliable source. They go a step further than that. Not only do they keep daily watch upon the herds and the human beings upon the farms, but they also keep close watch upon every person who is served with milk. The consumers, also, are looked after. If the Medical Health Officer comes upon a family where measles or scarlet fever has broken out, the supply is at once stopped, and they no longer deliver milk there at that house by the regular supply, but a special messenger is sent so long as there is any disease. This special messenger never enters the dairy, and the bottles are taken to a separate department and treated there. I asked the manager as to feeding and care, and he said, "We have not any regulations; they feed what they like." Do they feed what they like? No, they don't. The moment a can of milk arrives at the headquarters a little warm, or a little off flavor, or a little suspicious, they analyze it, and if there is anything wrong the can is set aside and that individual case is enquired into, and it goes right back to the source; and if there is something wrong in the feeding the representative of the company goes straight to that man and points out to him his error and it must be rectified. If something has gone wrong with the water supply it is detected and rectified. If by chance something has happened the cows that must be remedied, or if there has been want of care in the transportation, that is looked into. The whole thing is built upon the principle of following up every individual, and the result is that the Aylesbury Dairy in London is to-day supplying a very large number of hospitals, and has a trade which is the envy of every other dairy company in the city of London. From start to finish nothing is overlooked. There is thoroughness from top to bottom, and they have a world-wide reputation.

I had an opportunity of spending a few days in Denmark, and the moment Denmark is mentioned, you picture our great rival in the London market. Denmark is competing with us in the London market, and as you go through that country and make enquiry, you say, "How has all this been brought about?" It has not been brought about in a day or a year, or in five years or ten years. It has not been brought about by simply observing feeding principally. It has been brought about by putting into practice some of the principles I mentioned in connection with the work of the Aylesbury Dairy—that is, thoroughness from the bottom up. Some twenty or thirty years ago, the people of Denmark were in a state of uncertainty. Originally they were producers of grain, which they shipped in large quantities to Germany, and competition became keen. They began to raise hogs and they were shipping them alive to Germany. They soon found out that that was to be prohibited, and they sat down to study out the whole matter carefully. Here was a small country comprising some 10,000,000 acres of land in all. A small people, fewer in number than the people of the Province of Ontario, left in just about the same position as the farmers of the Province of Ontario were left when some twenty or thirty years ago the McKinley Tariff built up an inseparable wall between them and the Americans to the south. Some little time before this they had inaugurated a system in Denmark which was growing and growing, until it was beginning to assume pretty large proportions, so that practically every person in that country had what we might call a common school education. There were practically no uneducated people in Denmark. They saw that they must develop along special lines to meet the requirement of the English market which was then open to them, so then they began to produce the three things for which they have become so famous: bacon, butter and eggs, and they have done it thoroughly. They have not simply given special attention to one aspect but they began from the foundation, thoroughness in the work. The farmers organized themselves and began to discuss these questions and to ask for information. The government came to their assistance. Agricultural Schools were established. The Agricultural Colleges of Denmark at Copenhagen and the Veterinary College allied with it, were formed. Specialists who were engaged in these schools and colleges work in connection with the farm work in Denmark, and a great deal of improvement has been made. Their work has never been excelled and never equalled by any other country in the world, and the result to-day is that little Denmark exports agricultural products worth $90,000,000 every year, and about $80,000,000 worth goes to the British market. Out of $100,000,000 exported to other countries, about $90,000,000 are agricultural products. Don't you see that agriculture has been made practically the sole industry of that country? What has been the result? There are of course a few cities, for instance, the great city of Copenhagen, about the size of the city of Toronto. There are a few other towns, but the wealth of that country is not in the cities. It is not in its great millionaire manufacturers. The wealth of that country is spread all over that country. The wealth of that country is built up by the agricultural community, and the wealth of Denmark is second on the whole continent of Europe. You don't see great palaces or evidences of immense fortunes, but you see everywhere three or four things—intelligence, evidence of prosperity, no slums, everybody having enough and to spare; and you see contentment. I do not think I ever saw a more contented people in my life than I saw in the city of Copenhagen, and in the various parts of Denmark.

There is something about them that is a result of their development which attracts one to them, and to say, "Here is a work that is built up from the ground thoroughly and the results justify that thoroughness." We are all apt to consider the old countries in Europe out-of-date; but wherever you go there you will find thoroughness. It seems to me that in connection with agriculture in the Province of Ontario, as in every other province, and particularly in connection with this great dairying industry, we have got to get that same principle completely put into our practice. Sometimes we pile up the figures by the million, and say our exports are so many millions, and we are absolutely satisfied with ourselves. I was on a farm in southern Sweden looking over the establishment, and I saw the finest dairy barns I ever saw on any farm in any country. The farmer had fifty cows, and he kept a record last year of each one of these cows, and they averaged within just a few pounds of 10,000 pounds. That man had built that up on thoroughness. Don't let us be satisfied with piling up big figures by the millions, and saying that the dairying industry of the province of Ontario is a big thing. Does it make the individual dairyman any better off to be told or to know that we have reached a certain point in our production? The question comes up to you after all as an individual, and the proper aspect for you to take, the proper standpoint from which you as dairymen ought to look at the question, is that of the individual. If we neglect the individual, these great millions of exports will very soon disappear. Frequently you will find a man who is a great authority on cows, he is very strong on that point. Another man is more or less negligent of that, but he makes a study particularly of foods and rations. Another man is particular about the handling of the milk, and so on. Don't you see that this question is not a question of the cows, or the feed, or the care of the milk, but, as Mr. Hull stated, it is a great big circular question, taking in a great complexity of questions; and the man who is going to succeed has to be so thorough that he knows something about these things which go to make up that circle. But you may have all that knowledge and still fail. You may be the greatest expert in connection with the judging of dairy cattle, you may be the most learned man in connection with chemistry, you may be the most expert chemist or bacteriologist, and yet you may fail. The man must have that interest in his work, that love for his work, that desire to apply his knowledge, which will take a little knowledge and make it go a long way. That is the thing we most need in this country at the present time. We have enough knowledge. It is before us every day. Our agricultural papers are filled with it; the books we have in our houses and the daily and weekly papers are filled with knowledge. We get more than we can consume. That is not the point. The point is, how much of this are we assimilating and putting into practice in connection with our work? This question of the development of the dairying industry of the province of Ontario means everything to the individual dairyman. It is a thing of no consequence to him if all the other people are prosperous if he is not prosperous, and we have got to get it down to the individual. But the progress and development of dairying in Ontario, taken as a whole, means a great deal for this country. We had the Premier of Canada in Toronto recently, and he delivered an address mainly made up of information with regard to the development of this country. The next morning I read that speech carefully, and there were two things that stood out. One was the wonderful development of the agriculture of the Western Provinces, and the second was the wonderful discoveries of mineral in Northern Ontario. I think Sir Wilfrid Laurier did not know, or had forgotten and overlooked at the time, that last year the Province of Ontario in its field crop produced about ten million dollars more than did Manitoba, Saskatchewan and Alberta put together. (Great applause). And there are some others whose speeches have appeared recently in the papers who seem to be casting their eyes away from this Province. Don't let us forget that we have here in the province of Ontario a country with conditions and possibilities that no other part of the Dominon of Canada possesses, and no other part of the North American continent possesses, and don't let us be misled by these speeches, well meant as they may be. Although we have in the Prairies of the West, or the Mountains of British Columbia a great climate, there is a greater land than they have right here. One has only to look over an audience of this kind to see evidences of the prosperity of Ontario. You people are all fairly well to do, and I suppose if you were to tell us exactly what you have been doing it would be a little better than fairly well. You would not continue in the dairying business if you were not fairly prosperous. I suppose the farmers of this province, taking them as a whole, have had more prosperity these last few years than any other class of the community. You are not becoming immensely wealthy, and you would not be any better off if you were, for you are better off to be well off than to be immensely wealthy, although I suppose you would be quite willing to run chances along that line. It is for your own good that you are in a business where immense wealth is not to be found, but where a good living is to be had. There is no class of the community in Ontario that is in the position of having so many advantages of the home life as the people of rural parts. Unfortunately I have to live in the city, and every once and a while I say to my growing boy: "My dear boy, you will never know what you have missed by being compelled to grow up in the city." The province of Ontario still stands as the premier province of the Dominion.

The dairying industry should continue to be the most important part. We have our great fruit industry, and we must look to the fruit men to see that it is properly sustained. We have also our great live stock industry, and we must keep advancing it. But we can only develop these industries by going more thoroughly into the work, and thoroughness will depend on the individual dairymen, fruit men and live stock men of this country. Let us not decry what we call sentiment, true sentiment. Sentiment is that which helps a man to carry a heavy load as though it were a light one. Sentiment is that which enables a man to get up before daylight in the morning without grumbling. Sentiment robs the day of its drudgery. Sentiment causes respect for the father and veneration for the mother, and makes the boys and girls look upon that house not as a house but as their home. Give me a rural home, where all are working together, where the father and mother and the boys and the girls are all interested, and in the work, and where there is a true sentiment, and I have no fear of what is going to become of these boys and girls. Around that family there is going to be entwined that love of home which can never be forgotten, and there are going to be noble characters developed in these homes, humble though they may be. I know of no characteristic which is more powerful and more potent in the upbuilding and development of any country than the development of a strong, true, noble home life, bound together by the truest sentiment.

I wish the dairymen of Western Ontario even greater success in 1910 than they had in 1909, not simply and solely for the individual success, but for the sake of the people in our towns and cities as well. These poor people who are compelled to live within the narrow confines of town life or city, who do not know any thing of the generosity of air and sunshine. I therefore wish you success, because upon it will depend the prosperity and success of the welfare of the province of Ontario, which after all is the most important in connection with the people of the Dominion of Canada. (Applause).

NOMINATING COMMITTEE.

The following were then elected as a Nominating Committee:—H. White, R. Myrick, Jas. Symington, E. Ginther.

REPORT OF COMPETITIONS OF CHEESE AND BUTTER.

Prize List.

September White Cheese—		Total Score.
1st.	Prize, Mary Morrison, Newry	96.68
2nd.	" B. F. Howes, Atwood	96.57
3rd.	" J. E. Stedelbauer, Listowel (preference for flavor)	96.49
4th.	" C. J. Donnelly, Scottsville	96.49
September Colored Cheese—		
1st.	Prize, Donald Menzies, Milesworth	96.15
2nd.	" A. M. Herries, Lake View	95.98
3rd.	" B. F. Howes, Atwood	95.82
4th.	" Fred Cornell, Hawtrey	95.65

October White Cheese—

1st.	Prize,	J. E. Stedelbauer, Listowel	96.49
2nd.	"	C. J. Donnelly, Scottsville	96.41
3rd.	"	J. H. Williams, Embro (preference for flavor)	96.33
4th.	"	R. A. Thompson, Atwood	96.33

October Colored Cheese—

1st.	Prize,	J. E. Stedelbauer, Listowel	95.99
2nd.	"	A. E. Shapland, White Oak (preference for flavor)	95.66
3rd.	"	W. A. Bell, Pine River	95.66
4th.	"	C. M. Firby, Paynes Mills	95.65

56-lb. Box, Winter Creamery Butter—

1st.	Prize,	J. A. Waddell, Kerwood	95.98
2nd.	"	A. G. Patterson, St. Thomas	95.15
3rd.	"	R. A. Thompson, Atwood	94.99
4th.	"	T. J. Humphrey, Avonbank	94.73

20 1-lb. Prints, Creamery Butter—

1st.	Prize,	R. A. Thompson, Atwood	96.32
2nd.	"	E. M. Johnston, Innerkip	95.99
3rd.	"	R. Johnston, Bright	95.90

56-lb. Box, October Creamery Butter—

1st.	Prize,	Wm. Brown, St. George	96.56
2nd.	"	H. B. Lowe, New Dundee	96.15
3rd.	"	J. A. Waddell, Kerwood	95.90
4th.	"	W. A. McKay, Scotsburn, N.S.	95.23

SPECIAL PRIZES.

By the Heller & Merz Co., 22 Cliff Street, New York: To the buttermaker securing the highest score on butter in Class III and IV, colored with Alderney Butter Color, $10 in cash, Wm. Brown, St. George.

To the buttermaker securing the second highest score on butter in Classes III and IV, colored with Alderney Butter Color, $5.00 in cash. C. Richardson & Co., St. Marys, Canadian agents for Alderney Butter Color, R. A. Thompson, Atwood.

By The R. M. Ballantyne, Limited, Stratford, Ont.; One case of Hansen's Rennet Extract to the Cheesemaker securing the highest score on September white cheese, Class I, Sec. 1, Mary Morrison, Newry.

One case of Hansen's Cheese Color to the Cheesemaker securing the highest score on September colored cheese, Class II, Sec. 2, J. E. Stedelbauer, Listowel.

By C. H. Slawson & Co., Ingersoll, for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Cheese Color to the Cheesemaker securing the highest score on September colored cheese, Class I, Sec. 2, Donald Menzies, Molesworth.

One case of Hansen's Rennet Extract to the Cheesemaker securing the highest score on October white cheese, Class II, Sec. 1, J. E. Stedelbauer.

Note.—All cheese competing for the special prizes offered by The R. M. Ballantyne, Limited, and C. H. Slawson & Co., must be made with Hansen's Extract and Color. No special cheese required.

By the J. B. Ford Co., Wyandotte, Mich.: A handsome gold watch, Elgin or Waltham movement, 20 years guaranteed, value $20.00, to the Cheesemaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the best finished and most stylish looking cheese on exhibition, J. T. Donnelly, Union.

A handsome gold watch, Elgin or Waltham movement, 20 years guaranteed, value $20.00, to the Buttermaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the neatest and most attractive exhibit of butter, R. A. Thompson, Atwood.

Note.—All exhibits are eligible for these two special prizes.

By the Canadian Salt Co., Windsor, Ont., E. G. Henderson, Manager, $30 in cash to the Buttermaker securing the highest score on butter exhibited in any class, Wm. Brown.

$20 in cash to the Buttermaker securing the second highest score on butter exhibited in any class, R. A. Thompson.

Note.—No special butter required.

By the Western Salt Co., Mooretown, Ont., N. A. Leach, manager, one barrel Purity Cheese Salt to the Cheesemaker securing the highest score on September white cheese, Class I, Sec. 1, Mary Morrison.

One barrel Purity Cheese Salt to the Cheesemaker securing the highest score on October colored cheese, Class II, Sec. 2, J. E. Stedelbauer.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on 56-lb. box creamery butter, Class III and IV, Sec. 1, Wm. Brown.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on 20 1-lb. creamery prints, Class III, Sec. 2, R. A. Thompson.

Note.—No special cheese required.

By the Imperial Bank of Canada, a Silver Cup, to become the property of the Cheesemaker securing the highest total score, three times, or twice in succession, on two cheese; one cheese either white or colored, exhibited in Class 1, and one cheese either white or colored exhibited in Class 2. In awarding this cup the scores of the two cheese securing the highest score in Classes 1 and 2 (belonging to the same exhibitor) will be added. In case of a tie settlement is to be left with the judges. J. E. Stedelbauer.

Note.—No special cheese required.

Cheese Buyer's Trophy—Challenge Cup, valued at $150, to become the property of the exhibitor of cheese at the Winter Dairy Exhibition who shall receive the highest score three times, or twice in succession. Mary Morrison, Newry.

Won 1903 by Frank Boyes; won 1904 by R. H. Green; won 1905 by O. Schweitzer; won 1906 by J. Patton; won 1907 by J. E. Stedelbauer; won 1908 by Mary Morrison; won 1909 by J. T. Donnelly.

THE CHAIRMAN: It has been thought well to ask a couple of the gentlemen who judged the butter and cheese to address you on the exhibit, and I think it is a good idea. You will be privileged to ask any questions of these gentlemen. You are here for the purpose of getting information along this line and do not let any opportunity go by to ask questions that will draw out something in this discussion. I will now ask Mr. I. W. Steinhoff, a man of wide experience in buying and judging butter and cheese and who was one of the judges of the butter at this exhibit, to address you.

I. W. STEINHOFF: I did not have an opportunity of attending the creamery meeting at Guelph, which is the best opportunity you can get for discussing the question with regard to butter making.

When I saw the exhibit of butter here I was well pleased with it. It is more creditable than anything I have ever yet seen, especially with regard to the October exhibit. I think I can claim to be the father of the introduction of that October exhibit. We had two objects in introducing it; one was to test the keeping quality of the butter or to give an opportunity of testing the keeping quality, and the other was to give creameries making butter in summer time an opportunity to exhibit at the Winter Exhibition. No exhibition that I have seen hitherto has been altogether encouraging. This is the first exhibit that I have really felt proud of and satisfied with, and that I think is entirely creditable to the butter makers of Western Ontario. (Applause).

I would like very much if some of the eastern men, the men from Montreal who are rather prejudiced against western-made creamery butter, could have had an opportunity of looking over this exhibit. There is not a discreditable piece of butter in that exhibit. It is of an even character and of good flavor, and is rather a surprise. I feel like asking Mr. Herns how he obtained such a good exhibit as he had this year.

You are probably aware that the weak point in the western creamery butter is the flavor. I think that, in a number of cases, the trouble is that the cream is not gathered often enough. One weak point is that heavy sort of old cream flavor. I think the instructors are doing good work along the line of improving the cream, and I think more progress is being made in that direction, and this exhibit is an evidence of the improvement that has been made.

I want to get the names of every one of the thirteen exhibitors. There are still a great many of our good creameries that are not showing at this winter exhibition, and I think they should do so. I know Mr. Herns is doing all he can to encourage them.

I do not know that I have much of anything to say regarding the Print Butter Exhibit. I do not think it is of such a high order. One or two of the exhibits are not creditable. One has a very decided barn-yard flavor. The maker could not have been able to discover it, or he would not have sent it to the show.

The grass-made butter is the best. You cannot get the texture in the winter-made butter that you get in the grass-made butter. But I wish the creamery men advancement and success for the coming season, and I hope we will be able to see a more uniform article of better favor than we have ever seen before.

Mr. Robert Johnson: Being one of the judges appointed by your Association to judge your cheese, I have to congratulate you on the fine exhibit of cheese that we have had the pleasure of judging this year, and not only upon this but upon the large volume of entries and its fine quality. I can conscientiously say that I never judged or went through a finer lot of cheese than those at the exhibition here.

The judges on cheese have a very difficult task to perform, for the reason that the uniformity of product that you sent here to the exhibit is such that it places the judges in a very difficult position to determine between one cheese and the other. As regards the making up of the cheese, they are a credit to the cheesemakers of Western Ontario. The October cheese had a little of a starter flavor. It is not objectionable at all, and it disappears with age. I think it would be advisable that cheese for exhibition purposes should be forwarded to the destination, wherever our Show is going to be held, two or three days before they are opened up. Cheese coming in right off the express waggon we place on the shelves for judging, and it is pretty hard to give an impartial judgment on cheese of that kind, because they are cold and you cannot get the texture. I hope that will be remedied next year. Quite a lot of the cheese were without bandages, and I do not consider they are finished cheese unless they have bandages.. I do not think any exhibitor has a right to send a cheese here without a bandage. It is not a commercial product, because if I went into a factory and I found bandages off, I would not buy the cheese. I hope the boys will take this in good part, because we did not like to score the cheese down on that account; but wherever we found bandages off, we cut them a point on finish. I do not think you could get the same quantity of cheese of as fine quality as you have here on the American continent. I think you can thank your instructors a great deal for the uniformity of the product.

REPORT OF INSTRUCTION CHEESE FACTORIES WESTERN ONTARIO, 1909.

By Frank Herns, Chief Dairy Instructor and Sanitary Inspector, London.

It is with pleasure I present my third Annual Report of Instruction in Western Ontario. We have received the past season high prices for cheese, and the year has been a profitable one, particularly for the patrons. The work of instruction was carried on along practically the same lines as last year. Six Instructors were employed for cheese factories, and two for creamery work. Before beginning the work of the season the Instructors spent a few days at the O.A.C., Guelph.

We made in Western Ontario 390 tons more cheese in 1908 than in 1907, or a total of 17,221 tons. The returns for 1909 are not in yet.

THE QUALITY OF THE CHEESE.—The quality was kept up and in many cases improved, particularly at factories where bitter or yeasty cheese flavor formerly prevailed. During the hot weather some open cheese were reported, but not so many as last year. We are endeavoring to overcome this defect so far as possible. A few complaints were made regarding mould. Some buyers object to cheese which are very mouldy. Where mould is prevalent I would suggest a thorough washing of the shelves, woodwork and floors of the curing room with a solution of corrosive sublimate in the proportion of 1 of corrosive sublimate to 1,000 parts of water, and then burn sulphur about once a week in the curing room with, if possible, considerable moisture present. This will very materially help to keep down the mould. The cheese from some individual factories were reported as going off flavor with age, due no doubt to several causes. I have reason to believe that one of the greatest defects we still have to contend with is off flavors. Very few acidy cheese were reported. During the hot weather some coarse textured cheese were noticed due to over-ripe and tainted milk and in a few cases to wrong methods of handling. The finish of the cheese is improving and less complaint was heard this year in the matter of boxing.

LATE FALL CHEESE.—We again wish to point out the fallacy of not making provision for curing the late fall cheese. Buyers again complained regarding the manner in which in some cases these cheese were handled. The percentage of factory men whose attention should be called to this matter may be small, but there are enough fall cheese neglected in this way to have considerable effect on the reputation of our November and later made cheese. The press rooms in some cases are not kept warm enough. The cheese after being taken from the press are placed in curing rooms the temperature of which goes far too low, and not sufficient care is taken to keep the cheese at an even temperature. Even after two weeks the cheese are not broken down, the color does not develop, the texture shows pasty, and the flavor in some cases seems to turn bitter. Cheese of this character do not by any means come up to the high standard expected of Western Ontario cheese, and it is to be hoped that next season makers who may be guilty of neglect in this connection will make a special effort to take proper care of the cheese and see that an even temperature of at least 60 degrees is maintained in the curing room until the cheese are broken down.

QUALITY OF THE MILK.—16,586 patrons sent milk to the cheese factories during 1909. This is 690 patrons more than in 1908. The average percentage of fat in the milk for the season was 3.52. (In 1908 it was 3.5.) For May, 3.3; June, 3.35; July, 3.4; August, 3.48; September, 3.65; October, 3.9.

The average loss of fat in the whey for the season was .227 per cent. (In 1908 it was .23 per cent.) For May, .215 per cent.; June, .211 per cent.; July, .211 per cent.; August, .241 per cent.; September, .245 per cent.; October, .241 per cent. It will be noticed that there is very little difference in the average loss of fat in the whey for the first three months and for the last three months. The greater loss from over-ripe and tainted milk no doubt comes after the curds are dipped.

COOLING THE MILK.—There is no doubt that many patrons are improving in the care of the milk. More uniform methods are being adopted for cooling. Many, however, have yet to put in proper facilities for cooling the milk during the hot weather. In some sections patrons who have never made any attempt to cool milk except by dipping or stirring have this year put in cement tanks large enough to hold the cans surrounded with cold water or ice. Some are putting up milk houses in which a tank is placed. There is still, however, enough tainted and over-ripe milk arriving at the factories in hot weather to cause trouble in making the finest cheese. In sections where cold water is plentiful there is no excuse for any patron sending over-ripe milk, when a little care will reduce the temperature of the milk sufficiently to insure arrival at the factory in good condition.

Had the aeration of milk without cooling accomplished all that was expected no doubt further experiments would not have been required, but it was fully recognized that the condition of the milk did not improve as rapidly as it should through the system of aeration. Hence the necessity for some simple, inexpensive system that would be more effective. The cooling of milk in tanks or tubs of cold water seems to meet the requirements, and I have yet to learn of a patron cooling the milk by placing the can in cold water without any attention being paid to aeration that the milk arrived at the factory in bad condition. In fact all reports that have come to us are quite satisfactory, and bids fair where practiced, to make a rapid improvement in the milk supply.

PASTEURIZATION OF WHEY.—Had the old system of handling whey met the difficulties of the whey question, or was no whey returned in the cans, then the pasteurization of whey might not have been necessary; but it must be admitted by everyone that these conditions were not met. Pasteurization of whey eliminates so many abuses at a small cost that the results far outweigh any objections to the system. Cleaning tanks in the ordinary way did not get rid of bitter flavor, neither did the leaving of them without cleaning do so. Allowing the fat to rise to the top and the whey to become very sour did not put the whey in the best condition for feeding. Allowing the whey tanks to become filthy and ill-smelling was not improving our milk supply; therefore a system which when properly practised overcomes many of these conditions must have an uplifting effect. I have yet to learn of a factory adopting pasteurization and doing the work properly that has not had good results. Many factories troubled with bitter flavor for years are now practically free of it.

94 factories pasteurized the whey this year. 22 factories fed the whey at the factory, leaving 95 factories out of 211 not pasteurizing the whey. The average percentage of fat in the whey returned in the patron's cans pasteurized was .204. The average percentage of fat in the whey returned in the patrons' cans when not pasteurized was .1. The average acidity of the whey returned in the patrons' cans pasteurized was .37 per cent. The average acidity of the whey returned in the patrons' cans not pasteurized was 1.2 per cent. These figures are practically the same as last year. The average length of time required to heat the whey to 155 degrees was 1.49 hours. The average time the whey remained above 150 degrees was 2.4 hours. At a few factories they did not do a first-class job in the pasteurization of the whey. Several reasons might be mentioned. Some factories are not yet properly equipped for this work. The boilers are too small, tanks too far from the factories, water supply short, and insufficient attention paid to the general conditions necessary for proper results. However, the majority of the factories have done the work well, and the patrons seem to be well satisfied and quite willing to pay their share of the cost of pasteurization. The patrons should in all cases pay the cost, and I wish to point out that when makers receive pay for

the work they should in every case use their best efforts to see that the very best possible work is performed.

SEPTIC TANKS.—Another difficulty met with, particularly in the early part of the season, was that at some factories a great deal of whey was left over from day to day. This surplus whey became sour and acted as a starter in the fresh whey, making it difficult for the factory men to do good work as they had no way of disposing of this surplus whey. We would strongly urge that the patrons cooperate with the maker in emptying the tank each morning during the early part of the season, so that only fresh whey will be in the tank from day to day. Also that later in the season when the whey is short only each patron's share be taken. The most satisfactory method is to have a man measure out the whey. A number of factories have adopted this system. Another difficulty came about through the common practice of allowing the wash water to go into the tank. This not only had a tendency in some cases to contaminate the whey after it was pasteurized, but also diluted the whey, and made an accumulation difficult to dispose of until the latter part of the season, when the whey began to get short. Some of the factories, seeing this difficulty, began to put in septic tanks or other means of disposing of this wash water. Some factories were already in a position to handle the wash water. Factories which have put in septic tanks large enough to handle the wash water are having good results, and I would strongly urge factories intending to put in septic tanks to be sure they are large enough. It is better to have them too large than too small. Small septic tanks fill up with sediment, and have to be frequently cleaned, while the large tank works better and needs cleaning only at the end of the season. I would suggest a tank for an average factory to be 12 to 15 feet long, 6 ft. wide, 5 ft. deep, with 3 compartments.

COST OF PASTEURIZATION.—The pasteurization of whey has got beyond the experimental stage, has given excellent results where properly done and the cost will not exceed $1.00 per ton of cheese. Experimental work was done during the early part of the season in both Eastern and Western Ontario regarding the cost of pasteurizing whey, the results of which work will no doubt be published in some form later on.

WHEY BUTTER.—Only eight factories in Western Ontario made butter from whey the past season.

RENNET.—Considerable work was done by the Instructors relating to the efficiency and strength of the different brands of rennet extract in use the past year. The results of this work will probably be made known later on.

WHEY TANKS.—Our whey tanks are in much better shape this year, many new ones having been put in, particularly elevated tanks which have replaced the old worn-out ground tanks. The few steel tanks in use are giving the best of satisfaction, are easily kept clean and give every evidence of lasting for years. Cement tanks are not in the majority of cases giving good satisfaction, and I do not think it adisable to put in these tanks as the whey seems to dissolve the cement face and as soon as the rough surface is exposed all kind of trouble begins. There are, however, some whey tanks not kept clean. This is to be regretted, for there is no doubt that unclean whey tanks have a detrimental effect on the flavor of the cheese. We trust that next season a special effort will be put forth to keep these tanks in good condition.

SANITARY CONDITION OF THE FACTORIES AND IMPROVEMENTS.—$30,448 were spent this year by the factorymen in putting their plants and equipment in better condition, eight new factories were built at a cost of about $18,200, making a total $49,748 spent on our factories this year, 61 of which are Joint Stock or Co-operative factories, and 144 owned by private individuals. The sanitary conditions of our factories are steadily improving as fast as the owners can afford to spend money for these improvements. Most factories now have cement floors. Many are attending to the drainage and general surroundings. Some, however, are not in as good condition nor kept as clean and tidy as they should be. They lack that system in the daily work, and the neat appearance that makes the patron, the maker, and everyone else proud of the factory. Some factories will need considerable repair in the matter of floors, equipment, and several other ways before opening up next season.

Cool Curing.—21 factories have cool curing rooms, 8 more than last year. Some of these were not supplied with ice the past season, but the rooms have been insulated and put in shape to receive ice to control the temperature. We hear of several other cool curing-rooms likely to be installed this winter ready for next year's operations. Patrons are each year beginning to realize the necessity for cool curing along with cool milk, and are in some cases quite willing to assist the makers in erecting modern cool rooms. They are beginning to see the folly of making fine cheese, and then putting them in curing-rooms the temperature of which cannot be controlled with the result that the cheese are inferior when inspected, although they might have been finest when made and would have continued so had they not been heated. It is quite evident that had the money spent in past years in many cases on substitutes for insulation, such as sub-earth ducts, ice boxes, fans and so on, been spent in insulation, our curing-rooms would have been in far better shape to-day. However, we are beginning to realize that nothing will take the place of insulation if we expect to control the temperature in our curing-rooms.

The Culture.—188 factories are now using a pasteurized culture. This is a great improvement over the old ordinary milk starter or none at all. The makers are each year becoming more familiar with pasteurized cultures and are using good judgment in handling them. We wish, however, to mention here that it is just possible that some makers may get a little careless at times in handling this culture, allowing it to become over-ripe and of poor flavor. If such culture is introduced in the milk, the result will certainly be off-flavored cheese, perhaps not showing at the time of shipment, but in the buyer's hands later on if the cheese are held. The Instructors do their best to keep these cultures in proper shape, but if they are neglected in any way by the maker and become off-flavored, they will sow the seeds which may cause off-flavor in many cheese before the Instructor can make his regular visit and discover the difficulty. I would urge the makers to pay particular attention to the cultures. As soon as signs of off-flavor are observed secure another. Cultures with an acidity of from .7 to .75 per cent. are in the best condition for use and for propagation from day to day. All utensils which come in contact with the culture should be thoroughly sterilized, as it is useless to pasteurize the milk for a culture and then allow it to become contaminated by coming in contact with unsterilized utensils. Dippers with holes in the handles, wooden paddles, or anything but a wire handled solid dipper should never be used for stirring a culture. The thermometer should be sterilized by dipping in boiling water before coming in contact with the culture.

Alkaline Solution.—189 factories are using the acidimeter. The system followed the past season of having the Instructors make most of the solution as they pass from factory to factory seems to have given satisfaction, and very little complaint has been received this year regarding solution not uniform in strength. Many of the makers made their own solution after securing a supply of correct standard acid. The Instructors were supplied with standard acid of proper strength by the Chemical Laboratory at the Ontario Agricultural College, thus insuring the standard acid would all come from the same source. I would like to express thanks to the Chemical Laboratory for supplying us with this standard acid. I might here mention that I think it would be a good plan for the makers, particularly the younger makers, not to entirely discard the hot iron or rennet test but use them occasionally along with the acidimeter and keep perfectly familiar with these tests as they come in very handy at times.

DETERIORATION OF MILK.—45 cases of deterioration of milk were reported by the Instructors, these were looked after by the special officer appointed for this work, and fines ranging from $5 to $50 were imposed. Three cases were defended, but conviction was secured. One case was appealed by the patron from the Magistrate's decision before a County Judge. The Magistrate's conviction was sustained, the patron paying the cost of appeal.

MEETINGS.—District meetings were held during November and December in the different groups, where many points of interest to the industry were discussed. Some of these meetings were well attended, others were not. Since January 1st, 1909, to Oct. 31st, 1909, 145 annual and district meetings were attended by the Instructors or myself, with a total attendance of 10,057. The 16 district meetings held during the month of February, attended by Mr. Geo. H. Barr, who gave his illustrated address on "The Care of Milk," and Mr. Jos. Burgess, who spoke on "Cow Testing Associations," were very well attended, and did a great deal of good.

There are 205 cheese factories in the six groups, five more than last year, with 6 outside factories, making a total of 211 cheese factories. There were 602 full day visits, 565 call visits, making a total of 1,173 total visits to the factories. There were 934 curd tests made, and 522 of these samples were tainted. 310 patrons were visited, 2,441 new milk cans bought, 35,494 lactometer tests made, 1,101 Babcock tests made for adulteration, 1,176 Babcock tests were made other than for adulteration, 636 Babcock tests were made for loss of fat in the whey. 23 factories are paying by the test, the same number as last year.

QUARTER INCH WIRE CURD KNIFE.—The majority of factory men now use the one-quarter inch perpendicular wire knife, with a three-eighth inch ordinary horizontal knife, which are giving good satisfaction. Curds usually have only to be cut once with the three-eighth inch horizontal, and twice with the one-quarter inch perpendicular wire knife. This gives us cubes one-quarter inch by three-eighth inch, which are easily firmed, even with fairly fast working milk without rough handling, and insures under the average conditions a curd thoroughly firmed before sufficient acid has developed for dipping. With the old style coarse knives the curd often had to be cut several times to get it fine enough to be able to secure sufficient firmness, particularly if the milk was working fast, thus causing a loss of cheese solids, and in many cases the curds retain excessive moisture resulting in acidy cheese. The one-quarter inch knife has not only very materially lessened the number of acidy cheese, but has also helped to improve the texture.

We wish, however, to point out that in some cases when the wires become broken they are not replaced soon enough, and through this neglect the curd cannot be cut uniformly, bringing about conditions that are likely to result in open cheese. We would suggest that the makers keep on hand some wire necessary for repairing these knives, and immediately a wire breaks it be replaced with a new one if best results are to be expected from the use of the wire curd knife.

REPORT OF INSTRUCTION IN CHEESE FACTORIES, WESTERN ONTARIO. 1909.

Group and Instructors.	No. of factories.	No. of patrons.	Tons of cheese, 1908.	No. of visits.	No. of call visits.	No. of curd tests.	No. of samples tainted.	No. of lactometer tests.	No. Babcock tests for adulteration.	Patrons visited.	No. of new cans bought.	No. factories pasteurizing whey.	No. of factories making whey butter.	No. of factories paying by test.	No. of factories cool curing room.	Average per cent. fat in milk for season.	Loss of fat in whey for season.	New factories.	Cost of new factories.	Other expenditure.
																			$	$ c.
Stratford— Alex. McKay	36	3,103	3,752	118	83	268	188	4,612	121	58	542	17	......	9	9	3.6	.236	....	......	8,897 50
Listowel— Jas. R. Burgess......	36	3,350	2,552	94	75	59	13	8,129	115	26	453	11	......	5	4	3.6	.21	1	5,000	2,449 50
Ingersoll & Woodstock— E. N. Hart...........	36	2,056	4,115	107	105	209	152	4,400	51	90	120	21	......		5	3.5	.24	. ..	......	9,714 00
Simcoe— Geo. Travis..........	31	2,789	2,472	80	117	108	67	6,241	489	30	449	8	4	....	1	3.5	.22	....	......	3,630 00
Brantford— R. H. Green..........	28	2,515	1,755	100	107	243	67	6,214	155	81	332	16	2	2	1	3 45	.22	1	2,000	3,500 00
London— A. E. Gracey.........	39	2,872	2,395	103	72	56	35	5,888	170	25	545	21	2	2	1	3.58	.235	5	12,500	2,257 00
Outside Factories— F. Herns	6	......	......	6	....	....	....	......	......	....	......	....	......	....	......	......	......	....	.....	....
Total.........	211	16,685	17,041	608	559	943	522	35,484	1,101	310	2,441	94	8	22	21	3.55	.227	7	19,500	30,448 00

A number of samples of curd and cheese were sent by the Instructors to the Dairy department of the Ontario Agricultural College for moisture determination. Also samples of whey to the Bacteriological department, the results of which work will no doubt be mentioned in addresses given at this Convention. Samples of milk, curd and cheese were sent to the chemical department for analysis to endeavor to find out when and how the loss from over-ripe milk takes place and to what extent. No doubt this work will be continued again this year.

CONCLUSION.—The Instructors have put forth their best efforts to make the past season a success. I appreciate very much indeed the loyal, kindly feeling which the Instructors have ever shown towards me.

The Board of Directors, the Instructors, and myself have worked in perfect harmony and in a spirit of co-operation.

My sincere thanks are given to the Directors and the members of the various Committees for their hearty support. My thanks are tendered to the cheese and butter makers, factory men and buyers for their kindness to the Instructors and myself, and the assistance they have given us.

A STUDY OF YEASTS IN WHEY.

By S. F. EDWARDS, O. A. C., GUELPH.

I would like to say a word in explanation of the title of my paper. The origin of the work which we have done so far at the College was a conversation with Mr. Herns with regard to the off flavors which unfortunately we sometimes get in cheese, and as to the cause of some of those off flavors. During the fall Mr. Herns asked me for a title of what I would say to you at this time, and at that time we did not know exactly how our results were coming out, and I told him to make it "A Study of Yeasts in Whey." The real subject matter is the question of the influence of yeasts found in whey on the flavor of cheese.

The question of abnormal flavors in butter and cheese is fraught with interest to every commercial dairyman, for upon the flavor depends very largely the salability of the product.

Texture, keeping quality, etc., are important, but what the discriminating consumer pays for is palatability, and he is willing to pay a price commensurate with the appeal which the flavor makes to his palate. If the maker, then, can maintain or increase the desirability of the flavor of his product, be it butter or cheese, he is in a fair way to realize a better profit for his labor than the man who gives little or no attention to this important point.

Flavor in milk, butter, and cheese is due very largely to microscopic organisms, yeasts, molds, and bacteria, or indirectly, to the products formed by these organisms in their growth.

Some of these species of organisms are essential. Without the lactic acid bacteria the ripening of cream would be impossible. The lactic acid bacteria are valuable friends also in the souring of milk in the household, thus, to the popular mind, rendering it unpalatable before the putrefactive bacteria which are almost certain to be present, and which are far more harmful to the body, have time to develop. Roquefort, Stilton, and Gorgonzola cheese depend for their piquant flavor upon the growth of mold in their interior.

The clean flavor of cheddar cheese is believed at the present time to be due partly to the action of the enzymes or ferments present in cow's milk, and in the rennet used, and partly to the lactic acid bacteria which are always present. Aside from this clean, desirable flavor, there are at times special flavors, usually undesirable, and which to the best of our present knowledge may be largely at least accounted for on the basis of growth in the cheese of micro-organisms getting into the milk from various sources, and passing on into the cheese.

One of these special flavors is the so-called sweet or fruity flavor, a condition of cheese which is widespread through the Province of Ontario, and causes great annual loss. The need of exact knowledge on so important a point is evident. What the successful cheesemaker must have is a clear understanding of the causes which produce the most desirable flavor and of the treatment essential to maintain the proper conditions for securing that end. It is no less important that he should know the causes producing the objectionable flavors which occasionally appear, and methods for combatting the agents producing them. It was with a view of throwing some light upon this problem that the present investigation was undertaken. Though some results have been secured, much work remains to be done, and this paper should be considered as only a preliminary report of results obtained up to this time.

In considering the possibilities of the problem, the most probable causal agents of this off flavor were the yeasts, and our investigation has been confined entirely to these organisms.

Various investigators in studying the bacterial flora of cheese, have given the yeasts consideration only incidentally, and few have seemed to give them serious consideration in their relation to hard cheese other than a possible role in gas production. Russell and Weinzirl, in a report on the flora of six cheddar cheeses, mention yeasts only once, and in that case a bad odor had been noticed in the curd.

Weinzirl reported the results of examinations from 50 cheddar cheese from factories scattered through seven states and from Canada, and in only four cheeses were yeasts found.

In a study of the rolé of organisms in the ripening of cheese, Harrison, in 1900, found yeasts quite commonly present in Canadian cheddar cheese, and frequently in large numbers, although he does not appear to have considered them of special significance.

I have been able to find record thus far of the work of but one investigator on the direct problem of sweet flavor or fruity flavor in cheese. Harding, of the Geneva, N.Y., Experiment Station, in 1899 examined samples selected by cheese experts as showing fruity flavor, coming from thirteen factories in New York, besides several samples of unknown origin from commission men, and found yeasts present in considerable numbers in every cheese, ranging from 1 to 50 per cent. of the total flora. (Estimated.) Harding used starters of one yeast, isolated from a cheese showing a well marked case of sweet flavor, and succeeded in reproducing the flavor. His conclusions were: "Sweet flavor includes a group of undesirable cheese flavors. Clean flavored cheese contains few yeasts, while sweet flavored cheese contains large numbers of yeasts at least during the first stage of ripening."

The source of the yeasts studied in the present investigation was samples of whey sent by the cheese instructors in the round of their visits to the factories of Western Ontario.

Methods of Securing the Samples: The first containers prepared for shipping the samples were strong wooden boxes, lined with galvanized steel, and designed to hold a quart milk bottle or fruit jar surrounded with ice. These boxes were heavy and cumbersome and proved unsuitable for the purpose. The next method tried was the use of quart Thermos bottles. These were small and easily handled, and previous laboratory tests had showed that they were effective in keeping the temperature at a low point. In the first shipment of samples, the inner casings of two bottles were broken. This promised to be a very expensive method of securing samples, and it was discontinued.

It was now argued that inasmuch as the yeasts in the whey were the only organisms to be studied, and that the analysis was to be only a qualitative and not a quantitative one, that the troublesome species at least would survive until the samples could reach the laboratory even if they were not kept cold. Hence we adopted the method of having the samples sent in 2 oz. sterile bottles supplied by the laboratory. These could be sent by mail in paper mailing cases, and all the subsequent samples were handled in this manner.

Upon arrival at the laboratory the samples were plated in whey peptone beef extract gelatine, a medium which was found very suitable for the growth of yeasts, although it did not entirely inhibit the growth of other organisms. The plate cultures were incubated at a suitable temperature until all growth ceased, when colonies were isolated onto ale wort gelatin and retained for further study. In this way 25 samples from 25 different factories were plated, and from the plates from these samples a total of 79 yeast-like colonies were isolated. As would be supposed, duplicates were found in the samples from different factories. By comparative cultural methods the duplicates were weeded out until there remained 12 distinct species, upon which further study was made and which is still in progress. These 12 yeasts may be held to be representative of the yeasts distributed throughout the western Ontario district at the present time.

Action on Sugars.—The action of the yeasts on various sugars was determined as follows: A watery extract of ale yeast was prepared and to portions of this yeast water were added respectively the following sugars: Dextrose (grape sugar), lactose (milk sugar), maltose (malt sugar), saccharose (cane sugar), glycerine, and mannite. These sugar solutions were filled into fermentation tubes, sterilized, and inoculated with the yeasts. Fermentation tubes of fresh milk and of ale wort were also used in the test.

The results are shown in the following table:

Cultures incubated 90 hours, 25° C.

—	Yeast water.							
	Dextrose.	Lactose.	Maltose.	Saccharose.	Glycerine.	Mannite.	Milk.	Ale wort.
A2	....	....	....	....	......	......	....	....
A5	....	* 45%	....	....	......	......	* 30%	....
B2	* 25%	....	....	....	......	......	....	....
B4	* 25%	....	....	* 95%	......	......	....	....
D1	* 30%	....	....	....	......	......	....	....
J1	* 90%	* 50%	....	* 100%	......	......	* 40%	....
J2	* 98%	....	....	....	......	......	....	....
K1	* 75%	....	98%	* 60%	......	......	....	* 80%
K3	* 5%	....	....	* 40%	......	......	....	* 75%
O1	* 20%	....	....	....	......	......	* 8%	* 70%
P1	* 55%	* 40%	....	* 40%	......	......	* 90%	....
X2	....	....	....	....	......	......	....	....

*Indicate gas produced. Blanks indicate no gas produced.

Thus 9 yeasts fermented dextrose, 3 fermented lactose (in yeast water), 1 fermented maltose (in yeast water), 5 fermented cane sugar, 4 fermented milk, 3 fermented ale wort, and 2 did not ferment any of the sugars. The particular significance to the dairyman in these results lies in the number of yeasts able to produce gas in milk. Gas production in milk and cheese is often caused by bacteria, but these results agree with those of other workers in showing that gas may also be produced by yeasts present. In this connection it may be stated that in many samples of gassy milk and cheese received at our laboratory for analysis in the last few years, the gassy troubles were caused by yeasts.

ACTION IN MILK.—The effect of these yeasts in milk was examined in the following manner: Small flasks of skim milk were sterilized in steam, inoculated with the yeasts and incubated at room temperature. The cultures were examined at the end of four days, and their condition may be summarized as follows:

A 2—No odor, marked acrid flavor with slight astringent "after taste."

A 5—Pleasant yeasty odor, marked alcoholic taste.

B 2—No odor, very slight astringent taste.

B 4—Milk coagulated and partly digested. Supernatant fluid muddy. Very bad putrefactive odor. Not tasted.

D 1—No noticeable odor. Slightly astringent taste.

K 1—No odor, marked bitter flavor, especially the "after taste."

K 3—Slight yeasty odor, no marked flavor.

J 1—Pleasant yeasty odor, slight yeasty flavor.

J 2—Slight yeasty odor and very slight alcoholic flavor.

O 1—No marked odor, slightly acrid flavor.

P 1—Very soft curd formed with digestion beginning, slight yeasty odor, and yeasty flavor.

X 2—No marked odor or flavor.

Flask Cultures of the yeast in milk were also examined after 25 days, the results being summarized as follows:

A 2—Casein completely digested, sour odor.

A 5—Strong yeasty odor.

B 2—No apparent change. Strong bitter taste. Slight putrefactive odor.

B 4—Casein completely digested. Strong fecal odor.

D 1—Casein completely digested and slimy. Sour odor, like the off flavor found in curd.

J 1—Strong odor of beer.

J 2—Pinkish color on surface of milk. No marked odor.

K 1—Partly digested. Rancid butter odor.

K 3—No apparent change. Barnyard odor.

O 1—Soft coagulation of casein, strong yeasty odor.

P 1—Casein completely digested, marked pineapple odor. Also alcoholic odor. Characterized by Mr. McKay as a typical sour whey tank odor.

X 2—Culture lost.

The Dairy department of the College kindly agreed to make some cheese incorporating cultures of yeast into the milk. Cultures of three species were prepared, and on Dec. 15th Mr. Ralph made the cheese. His notes follow in full:

11 cheese were made Dec. 15th, 1909.

D 1—Good bodied curd. Flavor fair. Did not consider curd anything out of the ordinary.

K 3—Very bad curd. Decided strong barnyard flavor.

A 5—Fair curd. Flavor quite passable but not clean. Lactic acid did not work so fast on this curd.

Cheese judged Jan. 7, 1910.

D 1—Weak body. Flavor not clean.

K 3—Pronounced yeast flavor.

A 5—Rank flavor similar to flavor produced from rusty cans.

Cheese were made under ordinary conditions the same as in the factories. Cultures were put in the night before and curds worked a little fast. On A 5 the acid did not develop so fast. Used 140 lbs. of milk to each cheese, cured at temperature of about 60 deg. to 65 deg."

We hope to carry our study of these three cheeses further, and also to have more cheese made using the other yeasts in the starter.

If we admit that these yeasts are able to cause off flavors in cheese, the main point of interest to the cheesemaker is how they can be destroyed. Only one set of tests have thus far been made to determine the temperature at which they are killed, and this showed that of the 12 species, 5 were destroyed when subjected to a temperature of 144 deg. Fah. for 5 minutes, and 3 of the remainder were killed between 10 and 15 minutes at the same temperature. Some individuals of the other 4 species remained alive after 35 minutes at 144 deg.

Before making the application of these results to the cheese industry, it would be pertinent to give attention to the origin of these organisms, and their method of distribution. I have continued to speak of them in this paper as yeasts, and although our work on the determination of the species is not yet finished, I believe that some, perhaps all, are not true yeasts, but are species known as torulæ or so-called wild yeasts. These wild yeasts are widely distributed in nature, having been found in soil, on green and ripening fruits, and the leaves of trees. We frequently find yeasts developing in culture plates exposed to outside air and in dairy stables. Suppose one of the obnoxious species of yeast was present upon the farm of Mr. A., a patron of the cheese factory. We can readily conceive how it might get into his milk, and multiply rapidly there in the few hours that elapsed before it reached the factory. During the process of manufacture the yeast from his farm would find its way into the whey tanks, where it has excellent conditions for continuing to multiply and permeate the whole tank of whey. On the following day this whey is drawn off, and goes out, not to A.'s farm only, but to B., C., and so on round the neighborhood. If all the patrons of the factory scald their cans thoroughly enough to kill the yeasts, the epidemic is stopped, if not, and there are always some who do not scald the cans thoroughly, the yeasts on each farm multiply in the milk when put into the cans over night and go to the factory in vastly increased numbers, and the maker's troubles are multiplied accordingly.

The remedy is obvious. Kill off the yeasts from A.'s farm before they are distributed to the cans of all the other patrons of the factory. Our laboratory work thus far has shown that 8 species and most of the individual yeasts of 4 other species are killed in a short time at a comparatively low temperature. Pasteurization of the whey at the factory, before it goes into the patron's cans, is a sure and satisfactory way of combatting these troublesome micro-organisms.

Conclusions: Twenty-five samples of unpasteurized whey from 25 factories in Western Ontario were examined and 12 distinct yeast species were isolated.

All of these yeasts when grown in milk produced a bad flavor.

Three species used as starters for cheese are producing bad flavor in the cheese after curing 25 days.

Sixty-six per cent. of the species isolated are killed in ten or fifteen minutes at a temperature of 144 deg. Fah.

It is believed that pasteurization of whey at the factory is a remedy in most cases at least for off flavors in cheese caused by yeasts.

ADDRESS.

By G. G. Publow, Kingston.

I am sure that it is with great pleasure that I meet with the dairymen of Western Ontario. It is some six years since I had the pleasure of being here, and I have felt it is my loss not to be with you. We do not forget that while we live in the east and you are in the west that we are in partnership. We cannot get away from that fact. Anything that you may do to cause a loss to the dairy business affects us. If we do anything in the east that would tend to lessen the value of our cheese or butter or increase the yield of milk to make a pound of cheese, it is felt by you.

I would like first to express my appreciation of the splendid exhibit of cheese and butter you have downstairs. I never saw at your Western Convention so fine an exhibit as you have of both cheese and butter. I had the pleasure of going through them last night, and they certainly are a credit to the western part of Ontario. In fact I never saw a better lot of cheese and butter on exhibition as what you have at the present time, and Mr. Herns is to be congratulated on having such an excellent exhibit. I would draw your attention to the fact that a lady cheesemaker has topped the prize list again, which goes to show that we probably should encourage the feminine line of labor in our cheese factories. I would like to find out how it is that she trimmed both the western and eastern makers at the exhibitions.

I am down for some problems on cheese and butter making. In looking over your exhibit I find that you have the same problems to contend with that we have in the east. In eastern Ontario I have 950 factories under my charge and 28 creameries. I have 25 instructors. One of our problems is that of small factories. We have a great many very small factories, that are cheaply constructed and poorly manned. We also have in the east the problem of small production. We have made a special effort for over two years to find out what the actual yield per cow is for six months. Last year, the yield shown, according to the secretary's report, was 2,700 pounds of milk per cow from May until the 1st of November. And this year we find it is about 163 pounds greater than last year for the six months. We have another problem, and that is the yield of cheese per pound of milk. Our people think it is too high, and in the face of all our dairy education and instruction work, it is creeping up and creeping up, taking a little more milk for us to make a pound of cheese.

We found this year, the same as last, that our milk averaged 3.6 fat, and the yield of cheese per 100 pounds of milk was 10.6, practically just the same as last year. We are not getting the yield of cheese per pound of fat that in our factory practice with reasonable careful work we should get.

The problem, perhaps, with which we are most concerned, and that which will apply equally in the west as in the east, is that of flavor. The most difficult problem we have is to get a good flavor in all our cheese, and then there is the openness of make. In looking over your excellent exhibit last night, there is plenty of evidence that you have the same conditions here in the west. We have tried many ways of overcoming this. We find pasteurizing very beneficial, particularly in getting rid of the fruity flavors. That can be practically overcome by pasteurizing, but still we have defects in our flavors.

It seems to me that we have neglected the farm side of this work, and the problem with us is how are we best going to get the farmers to take an active interest in this matter. The practical cheese maker will readily admit that the quality of the cheese largely depends on the quality of the raw material. No matter how good your factory may be, or how skilled you may be in the manufacture of cheese and butter, it is impossible to make the finished product if you have not the raw material. In the east we have some very good factories, but notwithstanding that we have defects in the cheese made in these factories, and notwithstanding the fact that it is made by first-class men.

This year we had five Instructors do some special work. We took one of our best factories, and one of our poorest factories, and three average factories. In one factory, on August 7th, we had occasion to send an Instructor. This factory was above the average, manned by a first-class maker, and yet their cheese was being faulted and a claim of one-half cent a pound made on the cheese. We sent an instructor to make an investigation. He took in the milk. They accepted 12,252 pounds and rejected about 500 pounds. The milk tested 3.5 per cent. fat. The temperature of the milk they received in the vat was 83 degrees on that day, and it took 11.51 pounds of milk to make a pound of cheese. The instructor spent two days amongst the patrons of that factory, visiting the farms of the patrons who sent milk overripe and in a tainted condition. On August 11, he went back and made the cheese. He took in 12,700 pounds of milk and there was no milk rejected that day. The average fat was 3.5. The temperature of the milk received was 74 degrees, and it took 10.86 pounds of milk to make a pound of cheese from milk testing the same percentage of fat and made by the same man, and they had an increased yield of cheese of 67 pounds.

Q.—How much was the average in the first place with a temperature of 83°?

A.—11.51°.

That thing is taking place all over our country. Is there anything that can be done in our work that would pay the farmers better than giving their milk sufficient care? ? If we could get the milk delivered to the cheese factory in as good condition as our best patrons are delivering it, it would take at least one-half pound less milk to make a pound of cheese and that would mean over one-half million dollars in our factories each month. And that is a low estimate. Have we as cheesemakers done our duty? Have we put forth the effort that we really should, or are we responsible to any extent for what is taking place?

I believe, in the east, in many cases, where we have keen competition, the makers are taking in milk that they should not, and when we visit the farms they say, "The makers never said anything to us about this and they never sent any of our milk back." The extra care given to sanitary conditions, and the fuller attention given to proper methods of cooling the milk would have made a saving of 67 pounds of cheese in one day in a certain factory, and half a cent a pound added to the price because there was no claim made against the cheese, and that would make in that factory a profit for one day of $11.

Is it worth while setting our energies to the farm side of the question? The fact of the milk being in proper condition increased the yield and overcame the defects in quality, and it is quite evident to me that what caused the one was responsible for the other. Not only will we increase the yield in cheese, but we will overcome the defects that we have to contend with, and I am satisfied no money can be better expended than in reaching the farm side of dairying in this Province.

Q.—Counting the loss in cheese and cutting down the yield would mean a loss of $1,125,000?

A.—Yes. It was mentioned to-day about the cow's mouth watering for the ensilage, and we want the people's mouths to water for the cheese. It has been said that the flavor is the most essential thing in that respect. If people do not like the flavor of our cheese, then we want to make our dairy products attractive to the taste of the consumer. I believe if all the cheese made in Eastern Ontario had been of as good flavor as the best of our cheese, we would have gotten one-half cent per lb. more than we did. Should not that be sufficient to induce the farmers to take more care of their milk? We find that our cheesemakers are putting forth a special effort to become well qualified to do their work in the average factory, and the factory men are doing good work. We find that even our best makers, with the best factories, are having the same difficulties as the men in the poor factories, owing to the condition of the raw material.

I would like to see a special campaign made on the farm side of dairying. Get the people to do what is really necessary to enable us to give them a pound of cheese and as much as they should get from their milk. We may spend thousands and thousands of dollars in instructing cheesemakers and trying to get the cheese factories in a sanitary condition, and with but little advantage. I am sure that you have in the west spent as much money as your business would warrant in getting your factories in good condition. Probably not more than 200 cheese factories can be faulted in Eastern Ontario in connection with their sanitary condition. Many of them are cheaply constructed, but yet the buildings are clean. They have good water supply and underdraining.

In visiting the farms, we found the great majority of people were milking in the stable, and no special attention was given to sanitary conditions. Many of the cows were kept in unsanitary places, and very little attention was given to the cooling of milk. They put it into the can, stirred it a little and left it there, and when we found any fault, they say, "We have kept it there for twenty years, and have milked the cows in the same place, and never had any fault found with the milk." They will throw that up to you every time. We were told this morning in that excellent address how yeasts are spread all over the country, and we cannot find many factories in Eastern Ontario but where we will get that bitter flavor. We have the "billy-goat" flavor and the "fruity" flavor, which are easily overcome; but the bitterness in the taste is very difficult to overcome. You get it in nearly every factory in Eastern Ontario and there are very few of the cheese on exhibition here that have not got it to a greater or less extent. Some of them are perfectly made, but the flavor is bitter.

It is evident to me that the makers in the west are doing their work well. I never saw a finer lot of textured cheese on exhibition. They are smooth and silky and reasonably close boring. But your highest scoring cheese are off in flavor and that should impress upon you the need of having the milk cleaner and better cared for. No matter what we do in the way of cooling the milk and getting it delivered to the factory apparently sweet, the temperature is such that it is favorable for growth of fermentation and after the cheese are made, the flavor develops.

We have not laid sufficient stress on the sanitary conditions of our stables and the cattle. From observations in visiting the farms we came to the conclusion that the cow herself is the greatest source of infection. There is not enough care given to them and the places where the milk is kept are not proper, the whey tanks have been allowed to become in very unsanitary conditions. Our people, evidently, do not see the necessity of thoroughly scalding their cans from day to day. In a large number of cases we have found the people washing the cans with cloths and then they leave the cloths hanging on the stand or on trees or on fence posts, and they use these cloths for washing the next day.

The question comes to us: how are we going to get the makers to use their influence with the patrons to have this milk delivered in better condition? I believe the makers should be more honest with their patrons, and when the milk comes to the factory out of condition they should return it at once. I would ask you to place before them that partnership business, so that they will all work together to help along this cheese business. I am sure that there is not one factory in Western Ontario but what has more or less of the patrons delivering milk in first-class condition. And if all the milk were as good as that, it would take less milk to make a pound of cheese and the cheese would be better.

There never was a time in the history of Canada when we should put forth a greater effort to improve the quality of our product. The cry from the Old Country regarding our cheese is that we want them a little meatier. Our cheese are going to the market at an earlier date than they used to. They want them riper, showing a more meaty texture than they did a few years ago. It will not be safe for the cheese-makers of this country to make them much meatier until they get a better milk supply. You know as practical men that the more moisture we have in cheese, the greater the fermentation is, and it will not be safe for us to make them much softer than we are doing at the present time until we get better raw material. I believe, as I said before, that we can make for the people of this country a million and a half dollars by simply improving the sanitary conditions surrounding our factories, in the better care and production of our milk and the cooling of the milk to suitable temperature. Is it worth while? Are we going to go from year to year trying to find methods to overcome defects? Have we not gone far enough to know that it could not be done at the factory, and when we have learned that, have we not got wisdom enough to direct our energies to where it can be done to better advantage and at less expense? Now just so long as we continue in our present methods, so long will we have our common defects, and just so long will the people of this country who are producing the milk suffer the losses that are going on from year to year.

Q. You talk about whitewashing stables and all that; cleanliness at the start is the foundation of the milk business?

A. Yes, I am satisfied, myself, as to what is the cause of the loss. We have found in many curds that it took thirteen pounds to make a pound of cheese, and we have found when we had such a loss that our curds softened out, and whenever we had this we had very heavy loss due to the breaking down of the casein. Probably the bacteriologists can tell us why it is. When we found that condition of the milk, we always had an over-ripe milk and the inspection made at the farm showed less attention had been given to cleanliness in every way. I will say this to you, that in practically every case where we pasteurized the whey that defect was overcome.

Q. How many days intervened between these two tests?

A. Three days. There was only two degrees difference in the temperature of the atmosphere and it was entirely due to the people cooling their milk. Where the whey was not returned, we had less trouble with flavors and got a better supply. I could not say whether there was any difference in the yield or not. The less stirring you do in the cooling the better.

Q. By running over the aerator or stirring in the can, which do you recommend?

A. If you have a dusty place, and the atmosphere is not very good, you had better keep it in the can and cool it and stir it around. If you had an aerator covered it would be all right to run it over the aerator.

Q. Why lay stress on a cool curing room when the cheese is moved out within two or there days after it is out of the hoops?

A. If they are moved out two or three days from the hoops there is not very much necessity of having a cooling room, but I think farmers are making a woeful mistake in allowing their cheese to get away as soon as that. I do not think they should be away as soon as that.

Q. Who are to blame for that?

A. I think the farmers of this country are the men most concerned in this matter. They should see that their cheese or butter or whatever they have to offer for sale gets to the consumer in the best of condition. What you want is a good price and a good strong demand for your produce, and thus make a strong market for your goods. They are the men that we should be concerned about. Cheese if properly made from sound milk will go on improving for at least three months, and I think the farmers of this country are making a sad mistake when they do not see that their cheese factories are so equipped that the temperature can be controlled at all seasons of the year.

Q. When the cheese buyers and makers advise them to get them away in three or four days so that they will not lose in the shrinkage, what is the poor ignorant farmer to do?

A. That is it. We have had the same problem in the east, particularly in our poor factories. The makers seem to be anxious to get rid of them so as to save labor, and I believe for that reason alone the makers take in milk that they otherwise would not take in. They take in milk that they know perfectly well that cheese made from it will not keep. So long as they take in over-ripe milk and in a tainted condition they will not make good cheese. It requires the co-operation of every person concerned in this work.

Q. Don't you think that if all the factories could have cold storage it would make quite a difference in the yield?

A. Yes. I think that is one of the reasons why it takes more milk to make a pound of cheese than it should. The makers in the east are salting too heavily.

Q. Under the present condition of shipping out cheese every ten days, do you find cheese from cool curing rooms better than from ordinary rooms?

A. Yes. I believe the first weeek of the cheese is the most important.

Q. Do you find much difference in the yield?

A. In some factories not so much, in other factories we do. We find in our average factories in the east that they are not taking the advantage of the curing-rooms, and they still make a hard, stiff cheese. We had one or two factories this year that saved over a pound a box on all the cheese they made.

Q. Under the present conditions, is not a man who holds his cheese ten days placed at a disadvantage?

A. This year there was a time when it would have paid to have held the cheese. Of course, if a man holds his cheese and the market goes down, he is found fault with. I think you should not place yourselves in the hands of the speculator. Provide yourselves with the conditions whereby you can keep the cheese in the best way and the people will come after them. I do plead with the farmers to provide better conditions for curing and keeping cheese longer. Nothing that you can do will tend more to increase your home consumption than putting the cheese on the market better cured, and you must not lose sight of the fact that our cheese are going into a market in competition with cheese that are practically all cool-cured, and if we are to hold our position in the British market we must meet their conditions in the summer months. They produce their cheese in the winter time.

FURTHER EXPERIMENTS IN THE CARE OF MILK FOR CHEESE-MAKING.

By Geo. H. Barr, Ottawa.

[A report of this address will be found in the proceedings of the Dairymen's Association of Eastern Ontario.]

INSTRUCTION AT CREAMERIES, 1909.

—	Western and Northern.	Eastern and Southern.	Total.
	Fred. Dean, Instructor.	M. Robertson, Instructor.	
Creameries	39	34	73
No. of Patrons sending cream	7,225	8,082	15,307
Tons of butter made 1908	1,743	1,536	3,270
Tons of butter made 1909	1,735	1,545	3,280
Gain in tons 1909	....	....	10
Full day visits	122	108	230
Call visits	31	42	73
Patrons visited	294	122	416
Average % fat in cream	26.5	23.2	24.8
No. tests made for moisture	188	194	382
Average % moisture	14.77	14.56	14 66
Samples showing over 16 % moisture	32	23	55
No. of Creameries cream gathered	34	32	66
“ “ both C.G. & S.	4	2	6
“ “ Separator	1	....	1
“ Creameries using Babcock Test	38	25	63
“ “ “ Oil Test	1	9	10
“ “ “ Box Churn	2	2	4
“ “ “ Combined Churn	37	32	69
“ “ “ Scale for sample	2	7	9
“ “ “ large cans, C.C	11	11	22
“ “ “ jacketed cans, C.C	3	6	9
“ “ “ individual cans, C.C	20	4	24
“ “ “ cream tanks, C.C	4	13	17
“ “ “ small cans, C.C	1	....	1
“ “ first class storage	17	15	32
“ “ fair storage	13	10	23
“ “ poor storage	5	5	10
“ “ no storage	3	4	7
Average temperature of storage	48	39.5	43.7
No. Creameries good water supply	24	31	55
“ “ fair water supply	14	3	17
“ “ poor water supply	1	....	1
“ “ good drainage	24	29	53
“ “ fair drainage	12	5	17
“ “ poor drainage	2	....	2
“ “ using culture	6	1	7
“ “ “ cooler	17	8	25
New Creameries	3	1	4
Cost of new Creameries	$8,400	$1,968	$10,368
Other Expenditure	$4,515	$1,276	$5,791

There were in operation this year 73 creameries, 4 less than last year, 7 of these make both cheese and butter. 15,307 patrons sent milk and cream to these creameries, 1,162 more than last year, and only 1,678 less than are sending milk to the 211 cheese factories. This makes a total of 32,292 patrons engaged in producing milk and cream for the factories of Western Ontario, 2,852 more than last year. In 1908 there was produced in Western Ontario from the creameries 3,270 tons of butter, a gain of 338 tons over 1907. In 1909 there was produced from the creameries 3,280 tons, a gain of 10 tons over 1908. The average per cent. of fat in the cream for the Eastern and Southern Group was 26.5 per cent., for the Eastern and Northern Group 23.3 per cent. The average per cent. of fat in the cream this year was 24.8 per cent. This is a gain of 2.8 per cent. in the average per cent. of fat in the cream for the season, showing that we are gradually beginning to secure a richer cream.

66 creameries are cream collecting, and 7 are both cream collecting and separator. 63 creameries are now using the Babcock test, while only 10 are left which use the oil test. It is to be hoped that these 10 creameries will see their way clear to discard the old oil test churn before the beginning of another season and adopt the Babcock test. The patrons of four of the 10 creameries using the oil test held annual meetings in December, and gave their presidents power to sign a mutual agreement to the effect that they would change from the oil test to the Babcock test for 1910. This arrangement will no doubt be carried out, which will leave only six creameries using the oil test.

49 creameries are using the pipette for taking the sample for testing, 9 creameries are using the scales, and 5 the scales and pipette together. This is 6 more than last year. Only three creameries are now using the box churn; 14 creameries are using the pasteurizer, the same as last year. 24 creameries are using the individual cans for collecting cream, 12 more than last year. 22 creameries are using large cans for collecting cream. 9 are using jacketed cans, 1 creamery small cans, and only 17 creameries are now using the cream tank for collecting cream.

230 full day visits, 73 call visits were made, making a total of 303 days at the creameries. 416 patrons were visited, the Instructors going out on the cream routes at different creameries, and while the drawer was getting his cream weighed and sampled the Instructor had a short talk with the patron regarding the care of the cream and separator. This is evidently doing a considerable amount of good, particularly in sections where the creamery has been receiving too thin cream, and cream which is far too sour. In some cases the Instructors found the separators in bad shape, and pointed out to the patrons the necessity for proper cleaning and skimming of a richer cream to get best results. 382 tests were made for moisture in butter, the average moisture content for the season is 14.66 per cent., last year it was 14.33 per cent. 55 samples showed over 16 per cent. moisture. These samples were taken from 26 creameries, 14 in the Southern Group, and 12 in the Northern Group. We would like to mention here that we are getting close enough to the line in the matter of moisture in butter, and I would strongly urge the creamery men to look out for this point, and beg to point out that we must not overdo this condition. The average highest test for moisture was 15.9 per cent., and the lowest was 13.64 per cent. The average percentage of moisture in the Southern Group was 14.77, while in the Northern Group it was 14.56. 6 creameries use a skim milk culture, and one creamery a cream culture. 25 creameries are using coolers. The average temperature of the storages in the Southern Group was 48 degrees, for the Northern Group 39.5 degrees, the average temperature for both groups was 43.7 degrees. 10 creameries have very poor storage and 5 creameries no storage. A few creameries still have poor drainage.

The total expenditure amounted to $16,159, made up of 4 new creameries, $10,368, and $5,791 spent in the usual improvements.

The creamery meeting held in Guelph on Dec. 8th, was exceptionally well attended. The change from having set addresses and confining ourselves to discussions of special subjects seemed to work out well and many valuable points were brought out by the makers.

I wish to thank the creamerymen and Instructors for their kindness to me. The Instructors have done their very best to improve the quality of the butter, to get better equipped creameries, and worked hard to make the season a success.

CREAMERY PROBLEMS.

By Prof. H. H. Dean, O.A.C., Guelph.

What we shall have to say about creamery problems will centre about three words, which are associated with progress. These words are, *more, better, brighter.* We prefer these words rather than most, best, brightest, because the latter indicate the highest possible achievement and when man has reached this stage there is nothing further to be done—he may as well quit this phase of existence. Progressive, improving, do-better dairymen are what is needed in the creamery and all other branches of the dairy.

More Cream per Cow and per Acre. Larger dairy farms are not needed in Western Ontario. A greater need is more cream per acre of land on the present farms. Because cream is a more or less indefinite commodity it will suit our purpose better if we use the term, milk-fat. Some recent investigations in Ontario would indicate that the amount of milk-fat supplied to creameries is less than one-half pound per cow daily. If the average 100 acres carry ten cows, and the cows milk 250 days in a year, we have 1,250 lbs. milk fat produced on 100 acres—an average of 12½ lbs. per acre. If we spread 12½ lbs. fat over one acre of land we shall have a very thin coating—so thin that it could not be seen with the naked eye. If we can increase the milk-fat production to 300 lbs. per cow and the number of cows to 50 per 100 acres—a by no means impossible increase—we shall have a production of 150 lbs. of milk-fat per acre (worth 25c. per lb., $37.50) which would be a visible quantity. If this were done it would mean more profit to the farmer, less expense for hauling cream, and hence less cost for manufacturing, as the cost of hauling the cream is about one-half the total expense for making the butter.

More Butter per Gallon of Cream. A great deal of loss to the farmer and extra expense to the creameryman results from what is commonly known as "thin" cream, i.e., cream containing too small a proportion of fat and too large an amount of skim-milk. Manufacturers and agents of cream separators can do a great deal to assist on this point. With average milk the separator ought to be so regulated that not more than twelve per cent. of the whole milk is taken as cream. This will give a cream testing about 30 per cent. fat. The advantage to the farmer in having cream which tests about 30 per cent. fat is that he thereby has more valuable food for stock and more fertility for the farm. The creameryman obtains more butter from a given volume of cream which is likely to be of better quality, as it is the skim-milk in cream which is the cause of sourness and most of the bad flavors.

More Money per Pound of Butter. What is a pound of butter worth as human food? It would be difficult to give a direct answer to the question because the value of foods is always comparative. A food has a certain value compared with something else. Generally speaking, we believe that butter is worth not less than twenty-five cents a pound. If there was less poor, cheap dairy butter put on the market it would tend to increase the consumption and the price. If farmers would patronize creameries, instead of making the butter at home and selling it, or "trading it out" at stores, and allow the expert salesman of the creamery to sell the butter, the price of butter could be advanced at least five cents per pound. We know of a creamery which practically controls the butter market of a certain city, and as a result of the farmers having patronized this creamery, the prices obtained for their butter are fully five cents a pound more than they formerly received after paying the cost of manufacturing, and they are saved the labor and expense of making the butter at home.

Better Cream. Stronger efforts are needed towards the improving of cream, the raw material for buttermaking. Ideal cream is that which is not over 24 hours old, sweet and clean in appearance and flavor, and tests an average of about 30 per cent. fat. Where pasteurization is practised sweet cream is very important in order to reduce the loss of fat in the buttermilk. Experiments conducted at the O. A. College during 1909 gave the following losses of fat in the buttermilk when cream of various percentages of acidity were pasteurized:

Cream containing less than .35 per cent. acid; buttermilk contained .13 per cent. fat.

Cream containing less than .35 to .4 per cent. acid; buttermilk contained .2 per cent. fat.

Cream containing less than .4 to .5 per cent. acid; buttermilk contained .34 per cent. fat.

Cream containing over .5 per cent. acid; buttermilk contained .52 per cent fat.

These results indicate the importance of sweet cream where pasteurization is followed.

Cream containing a relatively high percentage of fat kept at a low temperature (50° F., or under) and delivered frequently (at least three times a week) are favorable conditions for obtaining *better cream* at creameries.

Better Butter. Better butter means butter of cleaner, sweeter flavor, uniform in color, properly salted and put up in packages suitable for the market to which it is sent, and shipped to the consumer while in a fresh condition. Where butter is to be kept for any length of time, or where uniform quality is desired, pasteurization of the cream is one of the greatest aids in making better butter. The markets of the world are asking for more butter and better butter. It is the business of the creamery managers to supply this demand and exact the price. In the words of a somewhat trite phrase, "Plan your work, then work your plan."

This leads to the central thought of my address. One of the biggest creamery problems is how to obtain

Better Managed Creameries. To obtain this it is necessary to have:

1. A good manager—a tactful, good business man.
2. Loyal patrons—those who stay with the creamery, through good report and ill, so long as the business is well managed.
3. Quick, safe sales with prompt returns are necessary.
4. Prompt monthly or bi-monthly settlement with patrons.
5. A proper system of book-keeping and clear, concise monthly statements.
6. Careful, honest drivers.

Brighter Men. It is no reflection on the men at present engaged in creamery work to say the business would be improved if brighter men were attracted to, and remained connected with, the creamery industry. Chas. Reade in one of his books says, "Better is a bright comrade on the weary road than a horse litter." To change this into modern dairy language we might say, "Better is a bright buttermaker in the creamery than an automobile or an air-ship for gathering cream."

We need men like those Goldsmith speaks of in his "Deserted Village":

> "He tried each part, reproved each dull delay,
> Allured to brighter worlds and led the way."

These are the men who hold the destiny of the creamery business in their hands. But we must not expect all to be smooth sailing. The creamery business has its ups and downs like everything else. Carlyle expresses this idea in one of his aphorisms: "The brightest triumph has a bar of black in it, and might always have been brighter." Another writer says: "We hesitate to call pain and sorrow evils, when we remember what bright characters they have made." All this leads us to express the hope that our dairymen shall not grow discouraged at results below expectations, nor give up because of apparent failures.

A term at the Dairy School will give a man encouragement, insight into the creamery business and enable him to solve creamery problems which cannot be solved so easily in any other way. There ought to be double the number of students at present in attendance at the two Dairy Schools of the Province. The founder of Cornell University, located at Ithaca, New York, said, "I would found an institution where any person can find instruction in any study." Our Dairy Schools ought to be institutions where any dairyman can find instruction in any branch of dairying.

To sum up the creamery problems they may be grouped as follows:

How to get more cream per cow, per acre and per farm.

How to get more butter per gallon or per 100 lbs. cream.

How to get more money per pound of butter.

How to get better cream, better butter, and better managed creameries.

And finally, how to secure and retain brighter men—better educated men—men whose hands and minds and hearts are in the creamery work. In this latter is to be found the main work of the revolving arm chair buttermakers, who may not know all the details of buttermaking and creamery practice, but who are, or should be, an inspiration to the toilers on the farm and in the factory.

Q. Will you tell us whether your skim milk was sweet or sour?

A. The whey and the skim milk was all sweet or practically so.

Q. Was that whey pasteurized?

A. The experiments I speak of were ordinary sweet whey. We conducted experiments comparing ordinary sweet whey with pasteurized whey. We found no difference in feeding ordinary sweet and pasteurized whey.

IS THE CANADIAN CHEESE TRADE IN DANGER?

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

I am glad to hear that you are having such a successful convention. I do not know that I have attended a convention in Western Ontario where there has been a better attendance than there is here this afternoon. I am sorry that I missed the morning session for I know some of the addresses must have been interesting. I listened with a great deal of pleasure to Prof. Dean's address, and I will take the opportunity of saying that there is just one point on which I would take a rather different view of the matter. I am sure Prof. Dean won't mind my objection. In fact that is one of the things he advocated: "Independence of Mind." While I quite agree that the returns which the patrons of cheese factories and creameries or others who are producing milk are not as large as they should be, and there is not as much profit in it as there ought to be, I would hardly take the view that he does, that we cannot expect to see any progress until the prices are higher. It seems to me that one of the surest ways of getting a higher price is to make a better article and take greater care in the production of milk and cream for the creameries. I know that certain creameries in Canada are paying a cent a pound more for their butter than the average creameries in Western Ontario where they are operating on the cream-gathering system. I have not a word to say against the cream-gathering system. I believe I was one of the first men in Canada to stand up for that system. We have been following poor methods, and by making better cream and by sending better cream to the creamery, I believe it is quite possible to raise the average price obtained for the butter by a cent a pound.

We say it costs 20c. a pound to produce butter, and unless we get more than that we are not getting any profit. I would not undertake to say at what point the profit begins in producing milk, because I think it is a very hard matter to determine. Supposing it costs twenty cents to produce a pound of butter, if we get twenty-one cents we get a cent profit, but if by better methods in caring for and sending cream to the factory, the butter is worth twenty-two cents, that is only one cent a pound in advance, but don't you see it means double as much profit, and that is the point we lose sight of. The same thing applies to the increase in the yields per cow. If you reach the point of profit at 3,000 pounds of milk a year, then if you raise it to 3,500 pounds, you have 500 pounds profit, but if you raise it to 4,000 pounds, you will have twice as much profit as you had on 3,500 pounds. And that is the point that I think we should keep in mind.

Mr. Barr advises certain methods of taking care of milk, and I am glad to say that I am sure you will recognize that the plan which he recommends does not involve any extra expense or labor. In fact it is rather less labor than any plan that has been recommended heretofore, and it has been proved without any doubt that handling milk in that way will enable the cheese maker to make a better article, and a better article means a better price, and that probably is one of the surest ways of getting a better price. Co-operation of the patrons and the cheesemakers is required.

If we were to judge of this matter by the comments which have appeared in the press during the last year or so, we might readily come to the conclusion that the Canadian cheese trade was in serious danger of being wiped out. 'Canada is Losing Her Cheese Trade," "The Cheese Industry a Declining One," "A Great Change has come over the export cheese trade of Canada within the past few years owing to the competition which has sprung up from New Zealand," "The only hope for Canadian cheese in the British market lies in the possibility of New Zealand turning to the manufacture of butter." These are some of the headlines and phrases which have appeared in the Canadian press during the past year.

Personally, I do not share these pessimistic views, and I propose to give you some of my reasons for disagreeing with such opinions. In the first place, let me say that not a single box of Canadian cheese has been displaced on the Old Country market by New Zealand cheese. As a matter of fact, the increase in New Zealand shipments is wholly a result of the decrease in Canadian shipments and not the cause of that decrease. I am personally familiar with the situation in New Zealand and I speak with confidence on that point. Had it not been for the falling off in Canadian exports, which resulted in a higher relative price for cheese as compared with butter, and thus encouraged the New Zealand factories to make cheese instead of butter, the New Zealand shipments of cheese would have shown very little increase during the last five years. The Dairy Commissioner for New Zealand appreciates the situation when, referring to the decrease in Canadian shipments in his last annual report, he winds up with the statement, "It falls to New Zealand's lot to supply to the home market this shortage in Canadian exports."

I do not propose to burden this paper with many statistics, but a few figures must be quoted in order to get a clear conception of the situation as affected by the respective exports of Canadian and New Zealand cheese.

A COMPARISON OF EXPORTS. In 1904, the Canadian exports reached the maximum, in round figures, of 233,000,000 pounds. In 1909, the quantity exported was 164,000,000 pounds, or a decrease of 69,000,000 pounds. In 1904, the New Zealand exports were 9,000,000 pounds, there having been little or no permanent increase for about ten years. In 1908-09 the exports from New Zealand to Great Britain had risen to 37,000,000 pounds, an increase of 28,000,000 pounds. It sounds big and rather alarming to say that the New Zealand shipments have been quadrupled in four or five years, but the actual amount of the increase is considerably less than half the decrease in the shipments from Canada. It will be seen, therefore, that the total of the imports of cheese into Great Britain from both countries is now smaller by 42,000,000 pounds than it was in 1904. It is difficult to see where there is any serious menace to the Canadian cheese trade in these figures. It is worthy of note also that the increase in Canadian shipments for the season of 1909 over those of 1908 will probably be greater than the increase in the shipments from New Zealand for the same period, and yet this fact scarcely receives a comment, while the New Zealand increase has been harped on continually.

I do not mean to say that the increased shipments from New Zealand would have had no effect on the market if the Canadian shipments had been maintained at their maximum. But then, as I have already pointed out, if the Canadian shipments had been maintained, New Zealand shipments would not have shown any increase. If there is any menace to the Canadian cheese trade in the New Zealand shipments, it is not in the mere volume of these shipments, but in certain qualities which the cheese possess and some other things which I shall refer to later. Overproduction alone, with the inevitable lower scale of prices, would work its own cure, for in that event the New Zealand output would at once decline and be replaced by butter. There are other aspects of the situation, however, which should give us more concern. We must not overlook the sentimental effect of a new supply on the market and when the supply presents such features as the New Zealand cheese does at present, it offers a rather good field for the operation of bearish tactics.

IMPORTANCE OF COOL-CURING. New Zealand cheese are all practically cool-cured, and, owing to the distance from market, they do not suffer in reputation, as ours do, by being sold in too green a condition, because, even though they are shipped as soon as made it takes about two months from the time they leave the factory until they reach the warehouse in Great Britain. We should have no difficulty in meeting that phase of the competition. Cool curing is becoming more general in Canada every year and there is no reason why we should not, with that improvement, give our cheese ample time to mature before they are sent forward.

Now, if I stopped at trying to prove that the Canadian cheese trade is not seriously threatened by the New Zealand competition, at least not for the reasons that have been advanced, I should be failing in my chief object in preparing this address.

CANADIAN DAIRYMEN AND THOROUGHNESS. It has been a sort of hobby of mine to study dairy conditions in other countries, and I have had exceptional opportunities for doing so. In following up this line of investigation, I have been impressed with two things, namely, the apathy or general indifference to cause and effect and a decided lack of thoroughness on the part of Canadian dairymen, as compared with those who compete with them for a share of the world's trade in dairy products. There is perhaps some excuse for this state of affairs in the fact that those other countries which I have in mind, like New Zealand, Denmark and Holland, specialize in dairying, and having their energies and thought directed along one line, they naturally become more expert and more far-seeing in that particular direction, than we do, who have our attention divided among several lines. Nevertheless, this carelessness, or lack of thoroughness, is a serious danger to the dairy industry.

AN INSTANCE OF LACK OF CARE. Allow me to draw your attention to a circumstance which Dr. Connell of Kingston mentions in his report of an investigation made last summer into the question of the pasteurization of whey, which illustrates this point very aptly.

You all know that the cheese factories have been advised to pasteurize the whey, or at least to heat it to a temperature of 155 to 158 degrees, in order to destroy most of the bacteria in it, and thus prevent to a large extent the contamination of the milk cans and improve the feeding value of the whey. Careful experiments and considerable experience have proved the value of this practice. Dr. Connell states that at two out of the five factories which he visited, the heating was being done without any tests of the actual temperature being made. The cheesemakers admitted that they had never used a thermometer to determine whether the work was being done properly or not. In view of the warning and advice given by those who have recommended this practice, that overheating would coagulate the albumen and thus prevent the proper distribution of one of the most valuable feeding constituents which whey contains, and that underheating would fail entirely in the object aimed at, and might be positively harmful, it is hard to find a word strong enough to properly characterize such slipshod practice, especially in view of the marked benefit which results from careful work in this connection. Here we have a case where somebody has incurred the expenses necessary to carry out the work, where somebody was paying for the fuel to heat the whey, and yet nobody knew whether the result aimed at was ever attained, or whether positive injury was not being done to the whey. Does the cheesemaker who deliberately neglects his plain duty to such an extent deserve to succeed? Do the owners or managers of a factory who will permit of such laxity on the part of employees deserve the confidence or support of the patrons? Do the patrons themselves who are so neglectful of their own interests as to allow themselves to be imposed upon in this manner deserve any better treatment than they get? I leave it with you to find the answers.

NO INTENTION OF BEING PERSONAL. I have no intention of being personal in mentioning these cases. I do not know what factories are referred to in the report of Dr. Connell. I have merely cited the facts as reported, because they are typical of things which are occurring every day in connection with our dairy operations. They are not confined to any one class. In a case such as I have quoted, I blame the patrons, in a sense, as much as I do the cheesemaker who had actual charge of the work. When they demand and pay for efficient service they will get it; that is, if they study their interests sufficiently to know when they are getting it. As long as they accept slipshod, inefficient service, that is the kind of service they will get. This is the sort of thing which, in my judgment, constitutes a greater danger to the cheese industry than any competition which is in sight.

Another danger to the dairy industry lies in the fact that a very large proportion of the cheese and buttermakers after a few years' work drift into some other occupation which offers greater attractions. It is a great loss to the industry that a large number of men with their accumulated experience should leave it every year, and there seems to be no good reason why a business which has been so prosperous and which has done so much for the country should not suffer sufficient inducement to a greater number of men who will be content to make it a life's work. It is largely a question of remuneration. I do not say it in a spirit of fault-finding, but I think it is a disgrace to one of the most important industries in the country that the men who, as a class, have contributed most largely to its success should receive such scanty reward. It would be nothing but good business sense to see that those who are responsible for the economical handling of the raw products and for the quality of the finished article, should be better paid. I do not advocate indiscriminate increase of pay so much as good pay for good men. I know enough about it to know that some men would cost more than they are worth if they worked for nothing.

Now I come to a matter which it seems to me constitutes a greater danger to our export dairy trade than any other thing that I know of. For some years past, especially since we began shipping our cheese so green, merchants in the Old Country have complained a great deal about the shrinkage in weight and the losses which they sustain in this connection. They point to the fact that there is seldom any loss on New Zealand cheese, because the practice is for the New Zealand factory to allow 1 1-2 per cent. off marked weights. I do not suggest that Canadian factories should make a similar allowance. A loss of this kind which is fairly constant in amount, becomes recognized as a part of the expense of handling the cheese and is eventually taken into account when the price is being fixed. That which I would draw attention to is a discrepancy between marked and actual weights of an entirely different character and it is not wholly due to shrinkage of the cheese.

Since this matter was first brought to my notice, I have been at some pains to collect facts concerning it, but I have hesitated for certain reasons to bring it up for public discussion. It has reached a stage, however, when some effort must be made to have it remedied.

I have secured the record of the weighings of 68 lots of cheese containing in all 7,131 boxes, among which there were 219 boxes wrongly marked as I have described, the errors varying from 4 pounds up to 12 pounds per cheese. Any difference of 4 pounds and over could not possibly be due wholly to shrinkage, and except in one case, where all the cheese in the lot were overmarked from 4 to 7 pounds, there is no reason to believe that the errors were due to inaccurate scales, because I find on examining the record that these errors occurred in lots of which the other cheese were either marked O.K. or showed only the usual loss due to shrinkage.

The plain facts are that these errors were due either to the grossest carelessness or to something worse. Of the 219 boxes wrongly marked, 193 were overmarked and only 26 were undermarked. The overmarkings amounted to 1,193 pounds and the undermarkings to 122 pounds. You can draw your own conclusions. The preponderance of overmarking is significant. Whether these errors were all the result of carelessness or whether some of them were deliberate attempts to defraud, makes very little difference in the effect which they have had on the minds of British dealers. The merchants believe that they are being cheated, and the loss and annoyance which result from claims for short weight are the very things to cause them to turn to other and more reliable sources of supply.

There is no man in the world who will quit trading with you quicker than an Englishman if he thinks you are not dealing fair. If you cheat him out of the value of 10 pounds of cheese under circumstances where there is a question of honor involved, he will feel more aggrieved and put more stress on it than he will for the loss of 100 times as much in a straight business deal. A large house in Glasgow made a contract last year with a Canadian firm for a quantity of a certain product, from another branch of agriculture. The Canadian firm threw up the contract and gave reasons as to why they were unable to fulfil their undertaking. It so happened that the Glasgow firm were better pleased than they would have been if the contract had been carried out; but I happen to know that they went to a great deal of trouble to find out if the reasons given for the failure on the part of the Canadian firm were the true ones. They wanted to know if this firm was honest and straightforward, because, if not, they would deal no more with them.

I have had many bitter complaints about this overmarking of cheese, and I know it is doing great harm. Canada has had a good name for honesty in the dairy trade. We have rather prided ourselves on it. Shall we allow that reputation to be tarnished either by inexcusable carelessness or deliberate dishonesty? Every dairyman in Canada is interested, because it means dollars and cents to him directly. Then let the factory management deal severely with the responsible party when cases of this kind are reported, as they will be if they occur in the future as they have in the past.

I am glad to be able to say that the great majority of factories mark their cheese correctly. The better managed factories are not guilty of such irregularities, but these remarks are addressed to all Canadian dairymen, and I hope they may have the effect of causing those who have been responsible for these shortcomings to be more careful in the future. It is up to the merely careless man to see that he is not classed among the dishonest ones. It is up to the factory managers to assure themselves that the weighing and marking of the cheese are done in a careful and honest manner. It will be worth while for the producers of milk to interest themselves in the matter, for it is they who will suffer for any loss of reputation on this account.

So much for the dangers which threaten the cheese industry. Let us now consider the assumption that because the exports of cheese and butter have decreased there is a corresponding decline in dairy production.

THE DAIRY INDUSTRY NOT DECLINING. I propose to take a few minutes of your time to show you, if I can, that the Canadian dairy industry, as a whole, is not declining, but that on the contrary, it is showing substantial gains from year to year. Of course, we do not expect to see any more of the rapid development which took place in the nineties, when new territory was occupied by the organization of hundreds of cheese factories and creameries. The field is now fairly well occupied in Quebec and in those parts of Ontario where dairying is likely to engage the attention of the farmers, and the extension of the industry is now chiefly limited to the development in the newer provinces and to improved production in the older districts.

Home Consumption Per Capita. It is impossible to quote exact figures, because, unfortunately, we have no annual statistics of the actual production of dairy produce in this country. That is why we have in the past relied on the figures of our export trade, of which we do have statistics, to measure the progress of dairying from year to year. With the rapid growth of population, affecting the home consumption, the export trade is no longer a reliable index of the growth of the industry, and it never was a true indication of its magnitude. I have made as careful an estimate as possible of the consumption of milk, butter and cheese in Canada, and I put it between 10 and 12 dollars per capita. The consumption of these products in the United States is said to be over $10 per head, and I think ours is larger; but to be conservative, we will put it at $10.

Total Home Consumption. The population of Canada, in 1901, was 5,371,315. At $10 per head the home consumption of dairy produce, including milk and cream, by that many people, would be $53,000,000. The combined value of the exports of cheese and butter in that year was $24,000,000 (I use even figures for simplicity), making a total production of $77,000,000. It is estimated that the present population of Canada is now about 7,184,700. On the same basis, then, the present home consumption in 1909 would amount to $71,000,000. If we add to this the $22,000,000 as the value of the butter, cheese and condensed milk exported during the last fiscal year, we have the sum of $93,000,000 as the value of the total production at present, or a gain of $16,000,000 since 1901, as against a decrease of only $2,000,000 in the exports between 1901 and 1909. Of course, the decrease in exports appears to be greater if we compare last year with 1903, in which year our exports of cheese and butter reached the maximum of $31,000,000. But conditions were abnormal that year and it does not make a fair comparison. If we average the value of the exports in the four years from 1902 to 1905, it gives us $28,000,000, which, compared with last year's figures, shows a decrease of only $6,000,000. Against this we have an increase in consumption of something like $2,000,000 a year, or $8,000,000 to $10,000,000 more than it was in 1905. I have used values only in making these comparisons, because it complicates the matter to deal with quantities of butter and cheese, and the total production of milk is the important thing.

Specific Increase in 1909. Then we get another view of the matter from the specific gains which are reported for the past year from various sections. The production of cheese in Prince Edward Island in 1909 showed an increase of 11,000 boxes, or 30 per cent. over that of 1908. This increase in due partly to more favorable conditions and partly to a keener and more vigorous policy on the part of the farmers. Prof. Cumming, of the Truro Agricultural College, speaking recently of the marked revival of agriculture which appears to be coming in that province, used these words:

> "The greatest evidence of improvement is the marked interest which is being taken in dairying, for which the Province is eminently adapted. This we can show best by stating that the demand for good dairy bulls is far in excess of the supply and, what is still more encouraging, those who are buying are, for the most part, seeking bulls from cows noted for their large production of milk. Whereas a few years ago it was very difficult to get a sale for dairy bulls from the College Farm, to-day the bulls that are available can be sold over and over again, there being five or six purchasers for every one of the animals and the demand being keenest for those from the best milking cows, for which the College herd is famous."

Mr. Putnam reports that the returns from the cheese factories in Ontario show an increase of nearly 100,000 boxes in the output for 1909, as compared with 1908. In Alberta the Dairy Commissioner reports an increase of 500,000 pounds of butter in 54 creameries in 1909, or 70 per cent. increase in two years. In Saskatchewan the increase in 1909 was 70 per cent. over 1908.

Exports for 1909. The exact quantity of cheese that will be exported for the season of 1909 will not be known until the last shipment is made, but all estimates show a substantial increase over the season of 1908. These estimates vary according to the source, but it seems safe to say that had it not been for the large shipments of cream to the United States the cheese exports for the past season would show an increase of well over 100,000 boxes. The exports of butter so far for the season of 1909 are about 50,000 packages less than in 1908, but the receipts at Montreal to November 30th were only 25,000 packages behind the previous year. It is plain, however, that even though the exports of 1909 are only equal to those of the previous year, there must have been a substantial increase in production to keep pace with the increased home consumption.

Export of Cream to United States. This export of cream to the United States, made possible by the reduction of the duty to five cents a gallon under the new tariff as against the former duty of two cents a pound, deserves special mention, for here we have a real menace to our cheese trade as far as it affects the volume of the exports. Every gallon of cream which is exported, under present conditions in our export dairy trade, practically means just that much less cheese for export, and the indications are that this export cream trade may grow to large proportions. The figures are available only up to the end of November, but they show a surprisingly rapid growth. Month by month they are as follows:

August	16,509	lbs.
September	121,602	"
October	390,993	"
November	700,599	"
	1,229,703	"

It seems quite probable that the total shipments up to the end of the year will not be less than 2,000,000 pounds of cream. As this cream is made very rich and averages over 40 per cent. fat, it represents somewhere about 1,000,000 pounds of butter. The United States duty on butter is 6 cents a pound, therefore, it is easy to understand why the cream is imported, because the duty of 5 cents a gallon works out a little over one cent a pound on the butter which it contains. How long this may continue I am unable to say. Well-informed people in the United States, with whom I have discussed the matter, say the tariff will not be changed during the term of the present administration. It must be dealt with by Congress, and I understand that there is great reluctance to having the tariff question opened up.

I do not see that the producers need worry over the matter so long as they receive good prices for the cream, but there is one feature of this development which is to be regretted. I refer to the closing of cheese factories and creameries by the purchase of cream direct from the farmers. The owners of these factories will lose both their business and their investment, and when the old duty is restored, as it most likely will be, sooner or later, the disorganization which has occurred will be awkward.

Decline of Export Would Not Mean Loss of Industry. But this cream business is somewhat of a digression, and to come back to the main point, I wish to make one more observation on the question of the export trade, and it is this. If it should happen that we do not increase our production as fast as the home consumption grows, we will undoubtedly some day see our export trade reach the vanishing point. While I think that failure to maintain our export trade would be a great pity and a loss from a national point of view—and I don't see any immediate prospect of its being realized—I have yet to be shown that our producers would suffer because they had found a market for their whole output at home, instead of being obliged to send a part of it abroad. The United States, in 1881, exported $16,000,000 worth of butter and cheese, but to-day, although they are producing more of these products than ever before, it is all required for home consumption and the supply has to be supplemented by imports from other countries. What is the result? Cheese is selling to-day in New York State at 16 to 18 cents, and butter at over 30 cents a pound. It may be of interest to state that the total annual production of milk in the United States is valued at between eight and nine hundred million of dollars, and the consensus of opinion among the leaders of dairy thought is that dairying is on the eve of the greatest development that has ever been seen in that country.

Summary. Now, to sum up, I have tried to place the competition of New Zealand in its proper light, so that you might see its true proportions and the particular way in which the competition may be felt, and thus be the better prepared to meet it. I hope I have convinced you that you are in a position to meet this competition on even terms at least; and further, that the most serious dangers which threaten the industry are to be found right at home, and not at the market end of the business.

I have also tried to show you that there is no general decline in the dairy industry, but on the contrary, that the prospects were never better than they are at present; that there is every inducement to push the industry to even greater proportions than it has yet assumed. At the present moment cheese is relatively the cheapest article in the provision line, and that makes for increased consumption and better demand.

I consider it important to correct any impression that the dairy industry is a decaying one, because repeated assertions to that effect would be one of the surest means of bringing about that result. If a man is persistently told that he is ill, or that he looks ill, the chances are he will soon be on the down-grade in health. Canadian farm industries are peculiarly susceptible to that sort of suggestive treatment. We have seen a rather marked example of that during recent years, in connection with a branch of agriculture closely allied to the dairy industry. It is important also that the minds of dairymen should not be diverted by talk of remote or even imaginary dangers from more real and present ones.

I believe it is desirable also that we should drop the habit of estimating either the progress or the importance of the dairy industry on the basis of the export trade, because that trade represents probably less than 25 per cent. of the total production, and that we should take more account of the home trade and how it can best be served. That part of the dairy business which consists in supplying milk, cream, butter or cheese to the Canadian people pays as well and is just as important, dollar for dollar, as the export trade is.

In conclusion, let me give you a calculation which may serve the purpose of impressing you with the magnitude of the industry in which you are engaged. The total value of our exports of butter and cheese from 1880 down to the end of the last fiscal year amounts to $359,707,012 for cheese and $62,399,931 for butter. If we add to these items the home consumption of milk, butter and cheese for the same period at $10 per head, we have the unthinkable sum of $1,885,089,703. Now, just think, if you can, of the enormous volume of milk which has been produced to be worth that much money, at $1 per 100 lbs. It would make a lake approximately eight miles long, one mile wide, and fifteen feet deep; and it would supply a stream ten feet wide and one foot deep, running at the rate of three miles an hour, for two years and two months.

The Chairman: I am sure you have listened with a great deal of interest as I have to this excellent address of Mr. Ruddick's. The point we are most interested in is the encouragement we get out of it to go on with this great industry. When I saw this heading a few days ago I was anxious to know what the outlook was for Canada, and I am satisfied to know what I have heard to-day that it is up to us to force this business along.

Prof. Dean: For fear I have given a wrong impression, let me remark that what I intended to say was that if you expect a farmer to take better care of his milk and cream you must pay him a correspondingly high price. That was the proposition I tried to make clear; that if he is expected to produce better raw material, he must see tangible evidence that it pays to do so, otherwise he is not inclined to follow any of these suggestions. That was the proposition that I tried to make clear. (Applause.) I am sure that we have all listened with pleasure to the very optimistic report which the Dairy Commissioner has given us with reference to the cheese business. I should be very sorry to think that our cheese business was in any danger, but my candid judgment is that there is danger in the cheese business. One point Mr. Publow referred to this morning was that question of the increased number of pounds of milk required to make a pound of cheese. I can remember when the rule in our factory was one pound of cheese for ten pounds of milk. I do not say that was a fair rule, but that was the rule under which the factory was operated. At the present time it takes practically eleven pounds of milk to make one pound of cheese. Why? There is one of the questions that the cheese men of this country have to answer, and the farmer is going to know why it takes eleven pounds of milk to make one pound of cheese when it used to be made out of ten. I have my own view on that question, but I have not time to take that up, although I do think it is one of the questions that should be given careful attention. One reason is that most of our factories pay according to the weight of milk delivered, and that, I believe, is the fundamental reason why it is taking more milk to make a pound of cheese. Until we change that system, it will not be remedied, and if we continue it it will take fifteen pounds of milk to make one pound of cheese. I believe it will pay our people to pay for milk according to its cheese-making value. (Applause.) We shall never be able to reduce the pounds of milk that it takes to make a pound of cheese until we pay according to the quality of the milk they deliver at our factories. So long as we put a premium upon watering milk and skimming milk we will have to look for an increased number of pounds of milk to make a pound of cheese.

Let me say a word in regard to the criticism that has been made with reference to the plan adopted by us to divide the proceeds of the factory according to the percentage of fat, plus 2. In that system we are trying to get at two constituents in the milk which covers its value for cheese making, namely, the fat and the casein. Since the principle has been adopted, we have a casein test, and to-day there is no excuse for any cheese factory not knowing what percentage of fat or casein there is in the milk delivered by each of the patrons. So far as our work has gone we have found that the plan which we adopt is near enough for all practical purposes—using the Babcock test to determine the fat, and the casein test as a check on any adulteration by watering or skimming. Let me say that I do not think it is possible to devise any system which will make men honest, but the plan we advise is based on the assumption that every man is honest until you prove he is a rogue. Other systems go on the assumption that every man is a rogue until you prove him to be honest. Which system is more correct? The system based on the percentage of fat plus 2 is, to my mind, the fairest and most practical system which has yet been devised, using the Babcock test to determine the fat and the casein test to determine the casein.

Q.—Are casein and fat alike for cheese and butter?

A.—No, the percentage of fat for milk and cream determines its value for butter-making. The percentage of fat and casein determines its value for cheese-making. There is a difference in milk for butter-making and cheese-making. These are questions we ought to consider. We have too many addresses and too many speeches, and not enough from the floor of the hall at these meetings. We should thrash out these questions and get the view-point of the man in the factory and on the farm, who are in contact with these things every day. The trouble with us revolving-armchair dairymen is, that we do not and cannot put ourselves in the position of these men on the farm and at the factory. Until we do that we are working at a disadvantage, and the advantage of discussion in meetings of this kind is that you get the viewpoint of men in actual contact with the business, and, therefore, I think that at all meetings of this kind we ought to have less speeches and more criticism from the floor of the hall. (Applause.)

THE CHAIRMAN: I quite agree with what Prof. Dean has said. While I have not had much to say as a practical man, because it was out of my capacity as a chairman to say anything. I have been secretary for one of my factories for over thirty years. I did not own the factory during the first part of that time. For over twenty-five years I have been secretary for the second factory, and for a number of years I have watched the gradual growth of the number of pounds of milk required to produce a pound of cheese. I can well remember the time in the early years, when our average would run, for a season, about 10 pounds of milk to produce a pound of cheese. I am not stating anything I cannot bear out as facts, because I have these records in book form taken down month after month, year after year, just as they actually occurred. They are valuable records, and I can go over them and make comparison. Two years ago, at the annual meeting, I gave the history of that factory for twenty-five years. I showed them the entire output from year to year, and the total, with the averages from year to year and the average price. The remarkable point in connection with it was the increased average price for a pound of cheese received. I do not want to say too much about these early days when we made a pound of cheese out of ten pounds of milk. We had all sorts of cheese on the shelves. We did not have the even grade of cheese that we have at the present time, and our cheese was frequently faulted. Sometimes we were bothered a great deal with what we used to call skippers. In later years we have never had a skippered cheese, and the even grade of cheese we are making to-day is all due to the instruction that has come out within the last five or six years. Within the last four or five years more had been done in Western Ontario towards improving and bringing out a uniform grade of cheese better than ever before. But I do not say that we have reached perfection, for while it is true that the average is higher, yet there is a cause for it. I think you will bear me out when I say that the percentage of fat is less than it used to be a few years ago. Another thing we are told by those who have given us instructions in the factories is that in order to get this uniform grade of cheese we have to handle the milk in a far different manner than we used to years ago. In 1864 I made cheese myself in one of our factories, and I can well remember how we took in the milk. It was very seldom that we rejected a can of milk. It was all put into a vat, and the process I went through then in manufacturing that into cheese was not at all as at the present time. We knew nothing at all about making individual curd tests. We had to be content with many difficulties in flavor that we have not to-day, and it was a very frequent occurrence to have a floating curd. As Mr. Barr said, when he started in the early days he had these curds looking over the vat at him, and I have seen them many times. We got more stuff out of the milk than we get now, but it was not to be compared in quality. There is another cause for it, generally speaking. All over the province there has been quite a change made in the kind of cow kept for supplying milk for cheese factories. In the early days the Holstein cow was very rarely heard of, and while we know that she gives a large flow of milk the percentage of fat is less than it used to be in the old days, and that, together with the fact that it requires a somewhat different handling of the milk and the loss of a small quantity of solids in order to get the quality, may have something to do with raising the average number of pounds of milk to produce a pound of cheese. A few years ago, when I came more in touch with this work than ever before, and joined this Association, and had an inside look into the work of the industry, it was stated that the industry that I represented produced the worst cheese in Western Ontario, and I did not feel very good over that. It was said, "If you want poor cheese go down to Simcoe district." One has a certain amount of pride in his business, and it was my ambition to be up to the rest of the trade, and I tore down my factory and put up a building that cost in the neighborhood of $5,000. I had a curing-room built so that it was frost proof when it was twenty degrees below zero, with a cool curing-room and ice chamber. I put in up-to-date machinery and engine house, separate from the making room, with a brick smoke-stack fifty feet high, cement floors, individual curd tests, and secured a maker who had been at the Agricultural College Dairy School, and with all these appliances I went at the business in earnest to build it up and make a better output. I got in touch with some of the buyers who never handled our stuff before, and I am safe in saying that at some of our sales the remark was made to me that they never expected to find such goods in that district, and they were far better than they thought of getting, and that was encouraging.

To come back to the point, I found the average number of pounds of milk to produce a pound of cheese was still growing, and my record was such that they showed considerably over 10 1-2 pounds of milk to produce a pound of cheese, and in some months it ran over 11. That is a part of the work I cannot overcome. Two years ago, when the question of pasteurizing was taken up, I was asked to preside at the Simcoe District meeting as Chairman, and I thought it was a chance to make some further improvements, and I determined then in some way to pasteurize the whey. We went at it and put in pipes, and our plan was to use the steam injector and take it up into the top of the tank. We did not run our whey into the ground vat, as we thought it took too long to get the steam to rise. Last year we tore that out, and just above the steam injector we put in another pipe, a live steam pipe, into the pipe that carries the whey above the injector, and we turned the live steam in there, and it was pasteurized as fast as it went up. Every day that whey was measured out to each patron in proportion to the amount of milk he sent in, and we had the work cut out so fine that we always kept the whey tank empty, so that it was cleaned with hot water every day except on Monday morning.

Then we adopted a plan of paying for this milk by test. Our plan was to test the milk, and to the butter fat test add 2 to represent the other solids, and I think in doing that I introduced a feature that has been the means of reducing the average number of pounds of milk to produce a pound of cheese more than anything I have ever done. I find on comparing the season 1909 with 1908 that the average number of pounds of milk required to produce a pound of cheese has run from one-half to three-quarter pounds less than it did in 1908. I have not yet made our annual statement, and I do not exactly know what the average will be, but I am satisfied by my observations from month to month that I am going to be away ahead of the year 1908 in the average number of pounds of milk to produce a pound of cheese. I do not expect to get down to that ten pounds, but I know that the change from the pooling system to paying by test, when first spoken of, caused a great deal of talk, and I had considerable difficulty in holding some of my patrons, and these same patrons have told me that they are well satisfied with it, and I have yet to hear from the first patron who is not satisfied. I have gotten away entirely from the old anxiety and fear that the Instructors will find some of my patrons tampering with the milk.

Q.—Why should that change reduce the amount of milk required to produce a pound of cheese?

A.—It was carried out throughout the entire season; we introduced it last May.

Q.—That would not change their cows?

A.—No, there was no change made in the cows. The quality in the year 1909 excelled anything that I ever had to do with since I have had any connection with the business. (Applause.)

ORIGIN OF THE DAIRY FARM COMPETITION.

H. B. Cowan, Editor of "Farm and Dairy," Peterboro.

I feel to-night that you are the victims of unfortunate circumstances. The conditions are something the same as those described by Senator Earl, of Michigan, who came over to address one of our conventions. He is cross-eyed. When he got on the platform one of the first remarks he made was, "I am cross-eyed, but it is not my fault. My father had a large family. Unfortunately I was the youngest in the family, and therefore, I had to take the only pair of eyes that was left." Your President met me at the head of the stairs when I came in and explained that he had been disappointed in the speakers and that he wanted me to help him out. You will see, therefore, that the above are the victims of circumstances.

At our convention this afternoon we heard something said of armchair critics of agricultural methods. To-night we have the pleasure of looking not at critics but at some of the real genuine articles: Practical farmers, men who have made a success of farming, men who have won the highest places in the prize farm competition which was held last year throughout the Province of Ontario. Your Chairman has asked me to say a few words on this prize farms competition and if you will bear with me I will venture to do so.

I think that you will agree with me that the object of all associations such as these as well as of our Agricultural Colleges and Farmers' Institutes is to ascertain the best and most successful methods of agriculture and to describe them for the benefit of others. There are two great sources of information, the theoretical and the practical. We were desirous of learning the methods that are used by our most successful farmers.

Some years ago Mr. W. J. Spillman of the United States Department of Agriculture, visited a farm near Philadelphia and discovered that a minister who owned it was making a great success of it although it contained only fifteen acres. When he bought it there was a mortgage on it of $7,200. The man who had owned it before had barely been able to keep two or three animals. The minister increased the fertility of that land so much that he was able to raise the roughage for thirty head of stock, including seventeen cows in milk. Within six years he paid the mortgage and later amassed a small fortune. The methods he employed were described in a bulletin issued by the Department of Agriculture and the demand for that bulletin was something phenomenal. It ran through edition after edition. Copies of it went all over the United States and people travelled many hundreds of miles to visit that farm.

Some twenty-five years ago we had here in Ontario our first good farms competition. It was won at that time by a man whose name is familiar to many of you, Mr. Simpson Rennie. Even to-day as he visits many parts of the Province as an Institute speaker, Mr. Rennie is pointed to as the winner of that prize. Any stranger who drives through that portion of York county, where his farm is situated, has it pointed out to him with pride. Farmers have gone out on the trains to visit that farm to study the methods that were used so successfully there by Mr. Rennie.

My own first connection with a prize farm occurred some ten years ago when I happened to be in Pontiac County, Que. A farmer invited me to spend the night at his place. While there I found that the Province of Quebec was in the habit of offering prizes for the best farms in the whole province. The province is divided into five districts, and each year there is a competition in one of the districts. The farmer whose place I visited had won the 3rd and 4th prize in his district. His children and his wife were quite proud of the honour. They showed me the medals and some of the prizes he had won. The following day he took me over his farm. He was planning to move his barns up on higher land to get better drainage, he had the tiles on his farm with which to do some underdraining and he intended the next two years to do considerable fencing to get ready for the next prize farms competition. He wanted to win the first prize if he could. As he drove men through the district he introduced me to several farmers who were doing the same. I concluded that a competition which stirred up the farmers to make such improvements was very commendable.

We sometimes hear discussions on how to keep the boys on the farm. One of the reasons why the boys are leaving the farm is because they read so much in the papers about successful doctors, lawyers, and merchants. I have often thought that if we could show what our successful farmers have accomplished it would do much to stir up the ambition of our boys and to lead them to stay on the farm.

A striking example of what can be done on a farm came to my notice a few years ago while visiting the farm of Mr. R. R. Ness at Howick, Que. When only 19 years of age, Mr. Ness left his home to work for his cousin. His wages were to be $200 a year and a share of the profits. That was not a very large salary. After two years his cousin wanted to sell the farm and Mr. Ness offered to buy it. He had only $400. He arranged to give a mortgage on the farm for $4,000 and his cousin agreed to trust him for the other $2,000. With the $400 he bought some of the live stock and second-hand implements and he had to get trust for some of them. The first year two out of the three horses he purchased died and within three or four years two-thirds of his cattle had to be disposed of on account of sickness.

At the time he purchased the farm he decided to make another venture and he picked out a wife, and from all I have heard that was probably the best investment he ever made. A great deal of his success has been due to the assistance he has received from Mrs. Ness. Although he is only thirty-five years of age, Mr. Ness has not only paid for that farm but he has bought the farm adjoining, and recently with his father and brother he bought a third farm. He has also built up the most famous Ayrshire herd on the continent. He has taken that herd from one end of Canada to the other, having won prizes at exhibitions from Halifax to Calgary. His prize winnings a year ago were only a few dollars short of $2,000.

Mr. Ness has constructed a barn which an official of the Department of Agriculture has said he considered to be the finest farmer's barn in the Dominion. It is laid out from beginning to end with an eye for economy of labor. It is fitted with electric light. Nearly all the south side are windows. Flowers are often kept in nearly every window. When you step inside the stable—he is milking I believe 80 head, his milk check for the month of November being something over $1,000—and when you look down that row of cattle, all nicely groomed, you cannot but feel admiration for their appearance.

Mr. Ness has pretty well solved the sanitary milk question. He hauls the absorbents he uses something like seven miles. He uses saw-dust. The most minute attention is given to the little points. After being in the stable some time I noticed that some of the cows were standing forward and others standing back. I could not imagine the reason so I asked him about it. He said, "Just notice the fore feet of the animals standing forward." Under each cow's fore feet there was a mat. When I looked at the cows that were standing back I noticed that they did not have that mat. I asked him to explain the reason. He replied, "I find that animals standing on a cement floor get tired in the front feet as the floor is hard on the feet. When I happened once to put some sacking under their feet I noticed that they enjoyed it and stood forward. Later, I found that these mats were cheaper and I purchased them. These animals that have mats are the most valuable ones. It is the animals that have not got mats that step back into the gutter."

These cattle are groomed regularly. Mr. Ness says that the cows enjoy the grooming about as much as they do their meals. Before the man who grooms them gets to them, the animals will stop eating and wait for him to come to them. He claims to have no trouble with the hired help question. Mrs. Ness told me that it often was hard to get the men out of the stable, because they like to stay with the animals. Frequently they got trips to exhibitions with them.

Mr. Ness has a good water system in the stable. Recently he won numerous prizes on his stock at Seattle.

Sometimes we find farmers who have fine herds of cattle but the rest of their farms are not well kept. Mr. Ness entered one of the prize farm competitions in the Province of Quebec and his farm won the gold medal over 22 counties, and as these are the leading counties in Quebec I do not think anybody will question but that his farm is the best farmer's farm in the Province. Mr. Ness farms with his head. He is observant, and as he travels around if he notices anything that is good he goes home and puts it into practice on his farm and that is one of the secrets of his success. Mr. and Mrs. Ness have just completed building a new house. It was planned from beginning to end by them. It is the most unique house I have ever seen. It is extremely well laid out, well lighted and I hope before long it will be possible to publish a description of that house.

We have in Ontario many successful farmers. Most of our successful farmers stay right at home and attend to business, and therefore we do not hear much of them. This is why we thought it would be a good idea to hold a prize farms competition in Ontario, so that we could find who are our best farmers and their methods.

This Association was represented on the committee of management by Mr. S. R. Wallace and by Mr. D. A. Dempsey, and we arranged to divide the Province into four districts. Western Ontario was divided by a line running from Goderich to Hamilton. This district was No. 4. Just here I would like to bear testimony to the assistance we received from three or four public-spirited men. Our expenses were about $1,500. Dr. Jas. W. Robertson, of Macdonald College, volunteered to give us $250, Mr. Henderson of the Canadian Salt Co., Windsor, gave us $200, and the De Laval and the Empire Cream Separator Cos. each gave us $200. This assistance made the holding of the competition possible. We had entries from one end of Ontario to the other. The contest was well advertised through the agricultural societies and dairy instructors and through the press. The fact that we had entries from almost every county in the Province shows that the announcement of it was pretty well spread.

To-night we are to have the presentation of some of these prizes. It happens that I know a few of these men. In district No. 1 the winner was Victor Begg, of Moose Creek. Mr. Begg is a man who went on his farm when there was just about five acres of cleared land, the rest being brush and swamp. To-day the farm is declared to be the best farm entered in the contest for the district east of Kingston. He has cleared it and under-drained and fenced it and has fine buildings and it is well stocked. Mr. Begg has become quite a wealthy man and he has done it all out of farming. In district No. 3 the first prize was won by Mr. D. Duncan, of the Don, who went through much the same experience. Mr. Duncan has made a success of his farming operations by intelligence and hard work.

In district No. 4 the winners were J. W. Richardson, of Caledonia, R. A. Penhale, of St. Thomas, and R. H. Harding, of Thorndale. We have all three of these gentlemen here to-night and I hope that we will be able to get a little information from them and I feel sure that we will succeed. In this competition all branches of the farm were included. Points were given for the house, including its plan and finish, the orchard and garden, the furniture of the house, library, etc. Every branch of the farming operations was taken into consideration. I thank you for the close attention you have given me and I hope that you will be able to derive considerable information from the gentlemen who are to speak to you to-night.

ADDRESS.

By George A. Putnam, Director of Dairying, Toronto.

Some few years ago I graduated from practical dairying to that revolving armchair to which Professor Dean has referred. Probably it is a good thing that you do not require many of these armchair dairymen. It is necessary to have a few, however, as all features of the work must receive attention, and each must do his part as thoroughly as he is able to. We believe that to carry out the wishes of the people so far as legislation and so far as expenditure of money are concerned is an important part of the work.

It is gratifying for me to know that from all over the Province we are getting reports of decided advances along dairy lines, especially during the season of 1909. We have it from our chief instructors who are in close touch with the business at all seasons, and the dealers in Montreal say that the advance in the quality of cheese is more marked in 1909 than in any previous year. The producers have advanced and the owners of the factories have made advances, and the makers, we believe, are becoming more and more proficient in the very important part which they have to play in this industry. The producers are advancing in two or three different ways; we have decided evidence in the reports for the past season that greater care is being shown on the part of the producers in the selection of the individual cow and also in the care of that cow, not only in her feeding, but in the care which is so essential to keep her in the best condition. One of the strongest evidences which I have of advancement along this line is shown in the fact that during the past summer there has been erected in Ontario by dairy farmers over 1,500 silos, and in Eastern Ontario alone over 1,000. That means the farmers are going to be able to furnish their cattle with succulent food, which is so essential to their economic feeding. In the care of the milk it is generally admitted and favourably commented upon that the farmers are taking greater care of the milk. They are not only using more cleanly methods, but they are cooling the milk properly. The owners of factories are showing their confidence in the future of the industry by spending money to properly equip their factories in order that they may have suitable places in which to manufacture this milk, which is delivered to them in much better condition than formerly.

When I came to the Department of Agriculture, some six years ago, we were much concerned in devising means whereby we could induce owners of factories to ask for instructors. Now the instructors are sought for and cannot go to all the places which apply as often as desired. There is a co-operation among the producers, owners of factories, and instructor which we are all glad to see. The makers are taking a greater pride in their business; and if we are to judge of the importance of the profession of dairying by the amount of knowledge required to make cheese of the quality now demanded by the market we must conclude that the makers are worthy of self respect. I remember the time when apparently the average maker thought it necessary that he should make a few poor cheese during the season in order to supply the home market. That day has passed.

Probably I was unfortunate in suggesting to the Secretary that I would say something regarding the future of the dairy industry. You expect that I will tell you what the future of this industry is going to be. I can only do that by asking you to what extent you are going to co-operate with each other. If you can tell me to what extent the owners of the factories and the makers will take advantage of the opportunities which they have, I can tell you something of the advance which we may make in the future. If you can tell me as to whether or not the farmers generally are going to have some definite object in view in carrying on their dairying operations, then I can tell you as to whether or not we are going to have an increased production per cow. Although we have been teaching the farmers at institute meetings, at the Agricultural College and through the press, what are considered the best ways to build up their dairy herds, the fact remains that in many sections of this Province the average production of the dairy cow is very little better than it was many years ago. In some sections we know there has been a marked advance in the production per cow, but the results in many sections are disappointing and discouraging to us, who are sending out speakers through the length and breadth of the Province. Although the farmers have been given instruction along herd improvement lines many of them have no definite object in view. If we could only induce the farmers to follow out some definite system, there are very few who would not use good judgment in deciding upon that system; but there is a lack of system, a failure to look into the future, and we appeal to the farmers to have some definite object in the breeding of their stock.

We have heard from Professor Dean and Mr. Ruddick this afternoon that you must improve the quality of the cheese if you are going to get a high price, or, on the other hand, you must offer the farmers a higher price if you are going to get a better quality. You deserve the higher price, but do not lose sight of the important factor which is more immediately under your control, a lessening of the cost of producing the milk. If you lessen the cost of production as some have done, you will reap a greater profit than you can hope to get in the near future in an increased price, and you are well fortified for lower prices if they should happen to come. The difference between the average production of the cows of Ontario and the possible is altogether too great. We hear of some farmers making very large profits, and a few who are making very fair profits, the majority are not making more than a living wage and what I want to do this afternoon is to impress upon the farmers the advisability of making a closer study of their own possibilities. We may continue to send speakers to you but unless you take advantage of the opportunities that you have for self improvement we will not get the advance that we hope to see. Why don't the farmers form local clubs or take greater advantage of the Institute meetings, and why don't they attend factory meetings in larger numbers? If you listen to the addresses on Agricultural topics or read the Agricultural press from year to year, you will notice that to a certain extent it is a repetition of the old story. No matter what theory we advance or what instruction is given the value of it is going to depend in a large measure upon the extent to which the information is applied to local conditions and how are you going to apply these theories and undisputed approved methods to local conditions. unless you can induce the farmer to take part in the discussion at Institute meetings and in their local clubs. We trust to see the club work extend greater than in the past. Professor Dean has referred to the fact that these conventions consist too largely of speeches, and not enough of discussion on the part of the makers. We consider that an Institute meeting or any sort of agricultural meeting gives the best results when there is free discussion.

I was talking to a fruit man in my office the other day. He is looked upon as the leading fruit man in Eastern Ontario. We sent him throughout this province from Huron to Glengarry, to give the farmers advice as to where to place their orchards and how to take care of them, and he is recognized as one of our best authorities. He told me that two or three years ago he considered it wise to cut down three or four acres of his orchard. It looked to be a very good orchard for a few years, but he found out that this certain section of his farm is not suited for the growing of fruit. He had planted his trees on this part and sprayed, trimmed, and cultivated for several years before he found out that the soil was not satisfactory. It was too shallow and the trees had not the desired vitality; so he took his axe and cut down the trees. When we find such varied conditions on one farm, it impresses us with the fact that farmers should be students and they should study their own conditions very carefully.

The owners of factories are for the most part building on a substantial basis, which shows that they have faith in the future of this industry; and we must join in that faith if we are to believe what the Commissioner for the Dominion has said. The high price for all lines of farm produce is likely to continue, especially for dairy products. The people are coming to appreciate the fact that butter and cheese and milk are the cheapest foods we have. The United States are lowering their tariff in order to get our cream, and I think they will soon reduce the tariff so that they will be getting our butter and cheese. We will have ever growing markets in the United States and Canada which will do much to insure an increased price for dairy products. Doctor Publow told me in Belleville last week that they are making a special soft cheese in the Dairy Department of Cornwall University, where they have a business of $25,000 per month, which gives a gross return of $8.00 for every 100 pounds of milk. This is a comparatively new line for this continent, and I believe we will find many new avenues for our dairy products. City people are asking for pure milk, and when they get it pure they will take it in larger quantities, even if they have to pay a higher price for it.

It has been suggested that we license factories in Ontario. We have discussed this matter for several years, but we could not formulate any method which we thought would work out satisfactory. If we license a factory, that license would have to be based upon some definite standard, and any standard to be of value agreed upon would put a great many of the present factories out of business, and we cannot afford to close up establishments built and equipped by private capital. We had to do the next best thing; so we have asked all the dairymen of the province to register their factories. We cannot very well refuse registration to a factory already established, but any new factory that is going to be erected, or any that is going to be rebuilt, will require to be approved of by a representative of the Department of Agriculture so far as sanitary conditions and equipment are concerned. This is the small end of the wedge and we believe some good is going to come from it. The certificate of registration is merely a formal acknowledgment that the factory has been registered with the Minister of Agriculture. We believe this is the beginning of a system which will eventually materially assist in putting the business upon a better basis. When the owners properly equip their factories they will demand that the makers shall be better qualified. If you go to the expense of putting up a good factory, you have the right to demand that the maker be well qualified for the duties which he is asked to perform. We are glad that the owners are placing themselves in a position to demand the service of well-qualified men. I have sometimes wondered how some owners, with dilapidated factories could approach a man who is qualified and ask him to make cheese in that factory. We believe that the outlook for the maker is brighter than ever before. The granting of certificates to the maker is going to place them in a stronger position and will be a protection to the well-qualified men. Very often the man who has been one season in a factory will go to a proprietor and state, "I am qualified to take charge of your factory and will make cheese for 15 cents less than the man you now have," and the proprietor thinks he is saving so much money, but probably he will find later that it would have paid him in the long run to give that man $50 to leave the country. We are going to grant certificates to makers who have had charge of a factory for one year or more, or who has been a chief maker for one or more seasons, and is recommended by his employer and the special committee. Beginning with 1911 we will grant certificates to all these men, and any person who has not had charge of a factory or been a chief maker previous to 1911 will be required to get practical experience in a factory before he will be given a certificate. The regulations will be such that it will be to the advantage of every man who wishes to secure a cheesemaker's certificate to attend a Dairy School. We shall not grant certificates to men because they attend dairy school and pass the examination. Such a course will assist them in this way: they will be in a position to get a permit or authority from the superintendent of a dairy school to take charge of a factory. He will work under that permit for one or two years, but he must show that he is a capable man before he will be granted a certificate from the dairy school. The regulation for some years has been that the man who takes a dairy school course must comply with certain regulations before he will be granted a diploma. Some of you will say that we will shut out the man who does not want to go to the dairy school. No person will be refused a certificate if he is a capable man. The Minister will have the right to grant certificates; and if a man is capable he will be given a certificate. Special cases will be considered by a committee and no person will be done an injustice. I think the dairymen have faith in the Dairymen's Associations and the Department of Agriculture. The dairymen have faith enough to know that we are not going to do anything which is unjust. A great many were afraid when we passed the sanitary law that some of the factorymen were going to suffer an injustice at our hands. I do not think, however, that any man claims that he has been unjustly dealt with. We have been criticized for having been a little too lenient in dealing with some of the men, who have not lived up to the regulations. We shall be liberal to start with, but must draw the line tight enough that the average standard of makers in Ontario will be higher than it is to-day.

Dr. Publow tells me that he believes there is no country in the world that has such efficient makers as we have in the Province of Ontario. (Applause.) He says our cheesemakers are an intelligent, competent lot of men. You must be intelligent, wide-awake men to shoulder the responsibilities which rest upon you. You have to keep on the watch; it is a trying business and a business which should command a higher salary than the average maker is getting.

I trust the makers will take advantage of the opportunity which they have of assisting a little more in improving the quality of the milk. We are sometimes quite discouraged when we consider what has been done for the producer, and the comparative slow advance along improved lines. We have sent out some sixty-five thousand leaflets on the care of milk and cream each season for several years. We have issued long circulars and short circulars and have tried in every way to keep something before the producers which would appeal to them. In spite of all this, I think you will find in most of the factories only a few men who ask, "How can I deliver the milk to the factory in the best possible condition?" A larger number by their actions say, "How bad can that milk be and still be accepted at the factory?" I trust that the makers will make it their business to get out among their patrons and let them know that they are anxious to have the milk kept in better shape.

I judge that Mr. Publow told you this morning something of the increased returns from milk which is properly taken care of, as compared with that which is improperly handled. A factory in Eastern Ontario making 12 cheese a day, was visited by the Instructor who made the cheese the first day of his visit, and got a certain number of pounds of cheese; then he got the producers to take good care of their milk for a couple of days with the result that they made sixty-seven pounds more cheese out of the same quantity of milk, and the quality of that cheese was better and commanded at least half a cent a pound more. As a result of these two days' work the increased return was thirteen dollars and some cents, and that means $13.00 profit per day.

We trust we may continue to see this co-operation among the producers and the owners; you are all in the same business and what is in the interest of the maker is in the interest of the owner. Let us put our shoulders to the wheel and make for the betterment of this growing dairy industry of Ontario. (Applause.)

THE CHAIRMAN: It is customary toward the close of the convention in the different cities where we have met, at this stage of the programme, for the President to vacate the chair and introduce to the audience the new President, who will occupy the office for the ensuing year, and it is my privilege this evening to introduce to the audience the President-elect of the Western Ontario Dairymen's Association of Ontario, and I bespeak for him a pleasant year. I know that he will be surrounded with a corps of efficient, earnest workers in the Board of Directors, and that they will be backed up by the entire Association. The new President represents the creamery part of the work. Previous to my election to the office it was occupied by a man who represented the cheese side. I do not know why it fell to my lot or honor to be selected to occupy this position. I represent both branches of the industry, the cheese and the butter. The new President-elect, Mr. John H. Scott, of Exeter, is a man well developed physically and mentally and socially, and well qualified to fill the office as chairman of any convention. It affords me a great deal of pleasure to call upon Mr. Scott to take the chair.

MR. JOHN H. SCOTT: I can assure you I feel very highly honored after the very flattering introduction that I have received from the Past-President, and I appreciate it very much. I also appreciate the honor that has been conferred upon me. It is some twenty years since I first began to attend the conventions of the Dairymen's Association of Western Ontario, and when I look back on those twenty years and read the distinguished names that we find on our programme, I have been led to ask the question, "Am I qualified to fill that responsible position?" I feel that it is an important position. We represent an Association that takes one of the foremost places in our agricultural interests to-day, and I feel that I am occupying a responsible place. I want to thank the members of this Association for placing me in this position, and I only hope I will be able to fill it as worthily, and with as much dignity, as the past President, and all the gentlemen who have had the position before me. Without further remarks we will proceed with the programme. (Applause.)

SANITARY MILK.

By Findlay G. Macdiarmid, M.P.P., Aldborough.

I am here to-night to show my good-will towards the Western Dairymen's Association, and to contribute in some slight measure to your gathering here this evening. I am pleased to meet with a body of men identified with such an important branch of the agricultural industry, and one that is doing so much to lay the foundation of the great national structure that we are building on this continent. I have heard some men say that our position with regard to the dairy industry is somewhat threatened at the present time by competition from New Zealand. This industry has been built up through slow years of noble endeavor, and I do not believe the people of Canada are afraid of competition. They welcome it, no matter from what country, so long as that country is prepared to pay fair wages to the men engaged in that industry. I do not believe our position in the old land will be seriously threatened. The pluck, intelligence and energy of the Canadian people is equal to any emergency that may arise. The dairy industry requires a great deal of intelligence to maintain. To-day it requires a comprehensive view of the whole situation, and a knowledge of sanitation, greater than it ever required before in the history of the dairy industry. If our cheese trade abroad and at home is to be kept in the proud position it occupies at the present time all the rules with regard to sanitation must be thoroughly observed by the dairymen. Perhaps in this northern climate we have paid too much attention to providing warm stables, and have neglected light and ventilation, and this is a question worthy of our consideration. It lies at the foundation of this great industry, and it is a question that must be faced squarely by the people of this province and of the Dominion of Canada. During the last session of the Ontario Legislature you will remember that the question of the dairy and milk supply was raised and an agitation sprang up in the city of Toronto. The matter was brought to the attention of the Legislature, when it was deemed advisable by the Government to appoint a Commission to examine into the production, distribution and transportation of milk in the Province of Ontario, and I had the honor to be appointed on that Commission. To-night I find myself in an embarrassing position. The report which is in the course of publication, practically compiled at the present time, has not been presented to the Legislature, and consequently I am not in a position to speak along the lines of that report, or to make known any of the conclusions we have arrived at. In connection with that I just wish to read a paragraph that struck me somewhat forcibly. It is published by the United States Agricultural Department, and is written by Edward H. Webster, and these are his introductory remarks: "It is evident that in nature's scheme for the nourishment of the young, milk was never intended to see the light of day, and if sucked from a normal healthy animal it is perfect food for the offspring. In this natural method of nourishment there is little possibility of contamination from outside sources. Since an artificial method of drawing milk is resorted to, however, there enters a study of conditions entirely new and different. The milk then comes in contact with the air, or the vessel into which it is drawn, and with particles of dirt from many sources." That paragraph struck me as containing the essence of the milk question from the sanitary point of view. In the model dairies of to-day where the question of sanitation is thoroughly understood great care is exercised in the milking of the cows and in the production of this high quality of milk. During the time the investigations were carried on, it was necessary to cross to the American side in order to compare how the milk supply was handled there in cities of similar size compared with the city of Toronto, and we visited the cities of Rochester, New York and Chicago. In the city of Rochester we had an opportunity of driving out and seeing the work that is carried on at the Tulley Farm. These men are engaged in the salt industry, and rather than fight a law suit over the overflow of salt wells, bought up a large tract of land near the city of Syracuse. What to do with that land was the question that faced them, and they decided to start a model dairy, and there we witnessed one of the highest possible sanitary conditions. We were there during the operation of milking. It was a dusty day when we arrived, and it was necessary that we should put on linen coats. Before milking was commenced the cows are all sprayed. The floors were flushed with water in order to keep down bacteria; the milking stools upon which the men sat to do the milking were sterilized; the suits of clothes they wore were sterilized; they rejected the first drawing of milk in order that any bacteria that entered the teat during the daytime would not get into the milk; and in that way they kept the bacteria down to a very low degree. The milk was immediately removed to a cooling room, and inside a quarter of an hour was cooled. The great secret in the production of milk is cleanliness at the source of supply; care in the transportation and handling of it, and the immediate cooling of the milk after being drawn from the cow. These are the questions which must govern the milk supply. A chain is no stronger than its weakest link, and no matter how careful you may be at the source of supply, no matter what care is taken, if it is not properly cared for in transportation it becomes contaminated and will deteriorate in value. Supposing it is properly handled in transportation and placed in a home where they are indifferent and put it in a kitchen at a high temperature where it becomes warm or in a pantry which has pickles in it or other food, milk is very susceptible, and soon becomes contaminated. An educational campaign that will improve the product of the milk and place it on a higher quality and place it on the market in a better shape will improve the cheese industry and every phase of the dairy question. Never before has the milk problem loomed so large; never before were people taking such active and intelligent interest in this question as at the present time. We must all admit the fact that a large percentage of children born to-day are fed on the bottle with cows' milk, and the cause which underlies this is the inability of women of the present generation on this continent to nurse their offspring; but that is not a subject I am going to discuss. It is a subject that is under investigation, and on which men hold divergent vews; but I am satisfied of this, that it is not unwillingness on the part of the mother but inability. We have to depend on cows' milk to raise a large percentage of the children that are born on this continent at the present time, and for that reason I say that the milk question is a very important one. What are they doing? Take the city of Rochester. Their pure milk supply is of world-wide renown. At the present time, through the efforts of Dr. Goler, they have established a milk depot. His object was to reduce the infantile mortality in the city of Rochester. The loss of life was appalling between the ages of one and five, and with a view of lessening this mortality, he undertook the controlling of the milk supply during July and in the warm months of the year. For these purposes he went out and made arrangements with the farmers to purchase the milk at the farm, and he engaged two trained nurses to go out there and take care of it. He erected temporary quarters in which they could care for the milk, and the milk was bottled under the supervision of these nurses and shipped in and distributed among the poor parts of Rochester at a nominal cost. Figures alone will tell you the result. It was about nine years ago since the work was started, and I have here the report of the work written by him. Prior to the time this system was adopted, of children under one year of age and under five years of age from 1888 to 1896 there were 6,629 deaths. For a similar nine year period, from 1897 to 1905 there were 4,403 deaths, a diminution of over 30 per cent. These figures represent deaths from all causes, and not merely those from intestinal diseases, so you see a falling off of over 30 per cent. under the simple process by which Dr. Goler was supplying clean, pure milk to the city of Rochester. Perhaps it would be unfair to say that it was all due to the milk supply. There was an educational campaign in connection with this work. These trained nurses when handing out the milk also disseminated useful knowledge to the mother as to the rearing of children.

The greatest asset we have in this country is our people and their character, and we want if possible to preserve the life of every child we can, and I think the infantile mortality of the province of Ontario is something that may well be looked into. It ought to be examined and must be examined in the light of the returns of the registrar-general. These returns are made annually by the different clerks in the different municipalities and they reveal a state of affairs which is not to the highest credit of the Province of Ontario. Here is an opportunity for philanthropists who wish during the hot months of the year to spend some of their money in saving the lives of children. I believe it is possible to do something along this line that will be of great benefit and enjoyment to those who undertake it. A start has been made in the city of Toronto along the lines that they are working on in Rochester and a similar start has been made in the city of Hamilton. During the present year they have gone out to the farms equipped with cooling stations alongside the dairy where the milk is carefully prepared and put into bottles for the purpose of being distributed to the children.

It has been said here to-night that never before within the memory of those present have conditions on the farm been as favorable as they are at the present time. I do believe that the outlook for the future is just as good as are conditions at the present time. Never before were there so many people living in the towns and cities who have a desire to return to the land; never before were there so many as there are at the present time who have bent their minds in that direction. Now is the time to act; now is your opportunity. It will never take less money to get located on a farm than it will at the present time. Conditions are improving, and the outlook for the farmer is exceedingly bright at the present time. We have at the south of us a great progressive nation—a country with enormous resources, and they are fast reaching that point in their development where their supply is quite equal to the demand. Their production is not equal to their consumption, and they are standing on the verge of being an importing country in many of the lines that Canada can grow successfully. With that market opening up before us I see no prospect of a lowering in price in any of the leading lines of agriculture that are being carried on in this country at the present time, in the Province of Ontario. I believe we have been too modest in making known to the world our own great natural resources. Men on the platform who are able to express themselves have pictured the great resources of this mighty Dominion. They have pointed to the great stretch of prairie in the west; they have followed province after province, from ocean to ocean, and the great west has been held out as the great opportunity for young men with small capital; but, I do not believe there is a province in the Dominion that has opportunities equal to those presented to a young man in the Province of Ontario, whether he be possessed of small capital or great. The supremacy of our position in confederation is not seriously threatened. We have great agricultural resources in the Province of Ontario. We have in this province great natural resources that are not yet fully realized or understood. Every day brings fresh discoveries of minerals in our northern land, and in addition to the minerals we have a great agricultural tract of land which affords great opportunities for the man with small capital, and who is willing to work. There is employment there all the year round. Cutting pulp wood in the winter time will pay for clearing the land. I wish to make this statement with the permission of the gentleman who made it. The Chairman of the Temiskaming and Northern Ontario Railway Commission, Mr. Englehart, was talking to me last night with regard to the prospect and the splendid showing that the Temiskaming and Northern Ontario has made during the past year. I said to him, "I presume your showing is due largely to the traffic in connection with mining affairs in that country," and he said, "The time is near approaching when that Government-owned railway will be a paying proposition from an agricultural point of view." Is that not a startling statement to come from the chairman of that road, a man familiar with that part of the country, to think that there are agricultural resources enough up there to make that Government railway a paying proposition?

Let me say in conclusion that there are many phases of the dairy question that interest us as a people. The highest results and the greatest achievement can only be attained through co-operation. Let us all unite, no matter in what walk of life we are engaged, to co-operate, the producer with the distributor, and the distributor with the consumer. Let all co-operate to provide the highest article of food in cheese and butter and milk that it is possible for any country to produce. We owe it to our children; we owe it to the great resources of this country; we owe it to the intelligence of the Canadian people.

THE CHAIRMAN: We come now to a very important part of our programme. I would ask the following gentlemen to come to the platform: Mr. J. T. Donnelly, R. A. Thompson, and J. E. Stedelbauer. To the generosity of some of the people interested in dairy supplies, the Association has been able to award some of the prizes. I have much pleasure in calling upon Mr. J. D. Brodie, ex-President of the Association, who will present these prizes.

MR. JOHN BRODIE: I am sure I express the sentiments of all present when I say that the task assigned to me on this occasion is a very pleasant one. I think it has ever been the custom, when any person has displayed superior merit or ability, that some token should be given as a reward for their genius, that the public may know of their merit and give them that honor that is justly theirs. The gentlemen who are to be recipients of these beautiful prizes this evening have attained to the highest distinction which it is possible for a cheese-maker to attain, and it is right that we should honor them for the reputation which they are making. We should also honor them for their character. I think it is true that every manufacturer puts just so much of his character into the goods which he produces. Then I think we should honor them for their example. They have given us an example of the ideal to which they wish to attain and that ideal has been perfection. I might just say we are all very sorry that Miss Morrison will not be here to be presented with her trophy. The speaker then presented the various trophies to the winners, with suitable observations.

The three recipients in turn briefly responded.

The Chairman: I would like to say of these men who have won these prizes to-night, that two of them have held the trophy for a year, and Mr. Thompson has been one of the largest money winners. Last season he won at London Toronto and Ottawa, and he also won again at our Winter Fair.

Mr. Arkell, manager of the Imperial Bank, spoke of the pleasure it gave that institution to donate the silver cup for a prize.

The Chairman: We have another very important item on our programme and I will ask Mr. J. W. Richardson, Mr. Richard Penhale and Mr. R. H. Harding to come up on the platform. In this section they are the winners in the dairy farm competition, and I have very much pleasure in calling upon Mr. Ruddick to make the presentation to these gentlemen.

Mr. Ruddick: I am sure that it is a very pleasant duty assigned to me, making the presentations in connection with this farm competition. I know something about farm life. I lived on a farm until about thirty years ago, when I came to live in St. Thomas, and I lived in this city for two years. The man who wins a competition among farms in Ontario wins no small honor. It has been my privilege to travel a good deal, and I have been in almost every State in the Union, and in a great many portions of the continent of Europe; and while in the older countries like England and Scotland, they have conditions not comparable with the conditions in the new parts, yet I want to say, without any boasting, that I do not know of any agricultural community where the people are depending on the land where you will find better homes, better buildings, and a greater air of comfort than you will find anywhere in this province. And I do not know any part of the province that is better than this particular district.

We are indebted very largely to the energy of Mr. Cowan, editor of the *Farm and Dairy,* for the origin of this work and for carrying out the idea. Mr. Cowan, I think, deserves great credit for what he has done in that connection, and I only think that that should be made plain. The first prize in this competition in District No. 4, was won by Mr. J. W. Richardson, of Caledonia. He had a total of 846 points out of a possible 1,000. He has the highest score on buildings, the second highest on live stock, and considerably the highest on crops. That seems to be a very creditable record. The second prize was won by Richard Penhale, of St. Thomas, with a total score of 814 points. He is the highest on the house. One particular feature of this house is that it has a most up-to-date water system, and if more houses had such water systems it would make life easier on the farm. The third prize was won by Mr. R. H. Harding, of Thorndale. He was tied with Mr. Shearer, of Bright, on farm management. This is a very important consideration and deserves a high place. The speaker then presented the prizes.

Mr. Richardson: I am sure we thank Mr. Cowan and those connected with this prize competition. When we entered into it we did not expect to be winners, but we did so with the intention of doing the best we could. I do not consider that it is at all due to my efforts that I have won the prize. We have what is known as the Riverside Farm, some distance from Caledonia, and it is some forty years since my father bought it. He was one of a large family, and necessarily when he started out his funds were low, and he had to buy as cheap a farm as possible, and he selected this one. It had been pretty well run down. At that time there was a great deal of navigation on the Grand River, and wheat and barley were grown for a great many years. When he got the farm it was badly run down, and the point he aimed at was to build it up and make a home for himself. Since that time the farm has been built up and one of the items in the building up of the farm was his attempting to grow lucerne or alfalfa. The first four or five years it was almost a failure, but he continued at it and now for a number of years alfalfa has been grown successfully. At first it was grain growing, and then beef raising, but the profits from beef were very low. About twenty years ago we began weighing our milk and selecting our cows in order to start up a dairy herd. For a number of years we continued the home dairy, and it is only during the last three or four years that we have been sending to the factories. At that time more land was required, and I think one reason why we adopted dairying more extensively was because it was necessary to specialize. We had a very good idea of what our cows were doing, and by weeding out the poor ones we secured a herd of cows that gave us profit. One of the great things in dairying is that you increase the fertility of your soil, and by so doing are able to feed two cows on the same land that used to feed only one. The main feature of our farm is the cheap production of alfalfa clover, roots and ensilage, and that is the way in which we think we have lowered the cost of production on our farm to a great extent and by doing that our profits have been immensely increased. (Applause).

Mr. Richard Penhale: I am sure it affords me a great deal of pleasure to be here to-night. It is with a degree of gratification that I bring this trophy to the township of Yarmouth, one of the pioneer townships of Ontario, and I am proud that my feeble efforts have been instrumental in bringing that about. I presume you want to know how we did the trick. I have conducted my farm on a principle of my own. A good many things that I have undertaken have been criticized very severely by outsiders. My farm comprises 100 acres of land adjacent to the city of St. Thomas; it is about two miles and a half from the city. It is divided into eight fields, five fields of 15 acres each, and two fields of 10 acres each, and one field of 5 acres. On the first three fields I conducted a three years' rotation and that has been in operation for over seventeen years—corn, grain, and hay. Two fields are in permanent pasture—native blue grass. One field of ten acres is an apple orchard, and on another field of ten acres I am raising alfalfa. Five acres contain the buildings and garden and a few small plants. Upon this farm I maintain 40 head of cattle on an average, from five to seven horses and from ten to forty hogs and one hundred head of poultry. This is the plan on which I have managed my farm for the last number of years, and I presume that it is the only course I could pursue to land this magnificent prize that has been given through the generosity of *Farm and Dairy*. We have a great many things to contend with. We are required to have better sanitary conditions. We have discarded the line-fence controversy to get away from the lawyers. (Laughter and applause). We have adopted a system of weighing our milk to find out the cows that are giving the best returns. We are engaged most largely now in supplying cream to the city of St. Thomas, and we find that to be one of the best propositions of the dairy industry at the present time. We are also able to raise quite a few hogs.

Mr. R. H. Harding: It is not necessary for me to tell you that I am proud to be a winner in the Dairy Farm Competition, although I will say that it was brought on in such short notice that I did not have much time to do any fixing up. I may tell you that I did not spend a dollar that I would not have spent if there had not been any competition. Right here I would like to thank the *Farm and Dairy*, and especially Mr. Cowan, as manager of that paper, for starting this good work. I do not think there have been many things started in this province that have done so much good as this competition is going to do. I am glad that they very wisely spread the influence of this competition over the whole province. My farm is just 97 acres, and I did not notice until Mr. Ruddick was speaking of it, that I just compared with Mr. Shearer. We are the highest two in farm management, and I also notice that I am the highest in the whole district in light and ventilation in my stable. I pin my faith to clover and alfalfa for keeping up the fertility of the farm, and supplying cheap feed together with the roots and silage. My farm happens to be four times as deep as the frontage, and that means a narrow farm. In order to economize in labor I run two systems of rotation. On the back half I run a two-year rotation, that is, I seed down all my white straw crops with clover. The balance is a three-year rotation, corn following the meadow and roots and grain and clover. I sow very little timothy—just enough to feed the work horses for farm work.

REPORT OF RESOLUTION COMMITTEE.

Whereas the success and educational value of this Convention is due to a marked degree to the splendid addresses given by the various speakers, we desire to express our appreciation of their efforts and extend to them our sincere thanks for their assistance.

That we, the members of this Association, desire to express our appreciation of the kindness of the Mayor, Council and Board of Trade in furnishing the free use of the Engineer's Building for the Convention and Dairy Exhibition, and we also wish to express our thanks to the citizens of St. Thomas for the kind reception they have given us.

That the thanks of this Convention is extended to the press of St. Thomas and other cities for the excellent reports given by them of this Convention.

That the thanks of this Convention be and are hereby tendered to the Canadian Salt Co., of Windsor, Ont., through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Association.

That the thanks of the members of this Association be and are hereby tendered to the Heller & Merz Co., New York; R. M. Ballantyne, Ltd., Stratford; C. H. Slawson & Co., Ingersoll; J. B. Ford Co., Wyandotte, Mich.; The Canadian Salt Co., Windsor; The Western Salt Co., Mooretown; Ryrie Bros., Toronto, and the Imperial Bank of Canada, for the special prizes kindly donated for our Dairy Exhibition.

That we feel as dairymen we are under great obligations to the Ontario Department of Agriculture for the assistance they have rendered the dairy industry, through the system of instruction that has been given, and also in providing speakers to attend annual meetings of cheese factories and creameries.

Upon motion of Mr. Waddell, seconded by Mr. Parsons, the foregoing resolutions were adopted.

The Convention then adjourned.

REPORTS OF THE DAIRY SCHOOLS, 1909-10.

THE ONTARIO AGRICULTURAL COLLEGE, GUELPH, ONTARIO.

STAFF OF LECTURERS, DEMONSTRATORS AND INSTRUCTORS.

H. H. Dean, B.S.A.	Professor, Dairy Husbandry.
R. Harcourt, B.S.A.	Professor, Dairy Chemistry.
H. L. Fulmer, B.S.A.	Demonstrator, Dairy Chemistry.
S. F. Edwards, M.Sc.	Professor, Dairy Bacteriology.
D. H. Jones, B.S.A.	Demonstrator, Dairy Bacteriology.
R. W. Stratton	Instructor, Cream Separators.
G. R. Taylor	Instructor, Milk and Cream Testing.
Alex. McKay	Instructor, Cheesemaking.
C. H. Ralph	Asst. Instructor, Cheesemaking.
F. Dean	Instructor, Buttermaking.
Miss Laura Rose	Instructress, Farm Buttermaking.
M. Robertson	Instructor, Farm Dairy Milk and Cream Testing and Farm Cream Separators.
F. G. Rice	Instructor, Soft and Fancy Cheesemaking.
G. Travis	Instructor, Piping, Soldering, Boilers and Engines.

The Dairy School term opened on January 3rd, for the regular long course in factory and farm dairy work, and closed on March 23rd. The total registrations during this term were 53, of whom 32 registered for the full factory course, and 30 of these wrote on the final examinations; ten registered for the Farm Dairy, of whom two wrote on the finals; one of those from among the twenty girls of the Macdonald Institute who took farm dairy work during the term wrote on a part of the final examinations, making a total of 33 who remained throughout the term. In addition, four students registered for the soft and fancy cheese work, and seven registered for special work in one or more branches of the term's work. We have quite a number of students each year who cannot remain the full term, but who come for a short time to gather information on some special point, such as bacteriology, milk and cream testing, etc. Many of these are students who have taken the course previously, but wish to keep in touch with Dairy School work.

A few of the students were starred in one or two subjects, which means that they will have to pass a supplemental examination in these subjects before their diploma will be granted.

Instead of issuing "A Certificate of Standing," as has been the custom in the past, the results of the examinations are being mailed to the students on a form like the following:

ONTARIO AGRICULTURAL COLLEGE.

DAIRY SCHOOL EXAMINATIONS, 191....

FACTORY CLASS.

Standing of..

The different grades are as follows:—(A) 1st class honors, 75%; (B) 2nd class honors, 60% to 75%; (C) Pass, 33% to 60%; (D) Failure, below 33%.

Subject.		Marks Possible.	Marks Obtained.	Grade.
Dairy Lectures		100	....	....
Dairy Chemistry		100	....	....
Dairy Bacteriology		100	....	....
Cheese-making.	Practical...	100	....	....
	Written....	100	....	....
Cream Separators.	Practical...	100	....	....
	Written....	100	....	....

Subject.		Marks Possible.	Marks Obtained.	Grade.
Butter-making.	Practical.....	100	....	....
	Written......	100	....	....
Milk-Testing..	Practical.....	100	....	....
	Written......	100	....	....
Miscellaneous Subjects..	Boilers Engines Piping Soldering Mathematics Book-keeping Cold-storage Veterinary	100	....	....

Rank............in Class of.......................................

....

Professor of Dairy Husbandry. President.

This is being done to prevent confusion with the "diploma," which is granted only after passing all examinations at the Dairy School, and after a student has been successfully in charge of a factory for at least two years, one of which must be after taking the Dairy School course.

So far as we can see, the recent legislation requiring all makers to have a certificate or diploma by January 1st, 1911, did not affect the attendance at the Dairy School term of 1910. It would seem as if makers are not taking the legislation seriously, or they are counting on receiving merit certificates which will enable them to comply with the regulation.

It has been suggested that the term should be made one of two seasons, taking up in the first year much the same work as at present, but leaving out the laboratory practice in dairy bacteriology and dairy chemistry. In the second term, which might be somewhat shortened, the work to consist of laboratory work entirely, including advanced work in milk and cream testing. If this is the wish of the cheese and butter makers, an effort would be made to comply with their request, although it would be difficult to do this with present accommodations. A new dairy building is needed, and also increased accommodation in the Bacteriological department. Our Farm Dairy quarters are very much cramped, and are very much out of date. New and better rooms and equipment are almost a necessity for our Farm Dairy students, of whom quite a number (20 to 25) come to the Dairy each year from the Macdonald Institute, and who are not included in the list of students credited in attendance at the Dairy School. About our only consolation in the past has been that it is neither the buildings nor the equipment which makes a dairy school; it is the men and women who comprise the instructors and students. However, an up-to-date plant is an important factor in securing good results, and we would urge upon the authorities the need of a modern dairy building in keeping with the great dairy industry of the Province. The old building, in which are located the Farm Dairy and Cheese Branches, was built over thirty-five years ago, and is almost beyond repair. The newer building—erected in 1893, is too small to accommodate the classes. It is also badly located for drainage and in relation to the other buildings on the College Campus.

SHORT COURSES FOR INSTRUCTORS—MILK AND CREAM TESTING.

In addition to the regular course of about twelve weeks, two short courses of one week each, both running concurrently, opened on March 28th. One of these is for the Instructors of Western Ontario, who visit the creameries and cheeseries regularly throughout the season. The course consists of advanced lecture work and laboratory practice in the Bacteriological and Chemical departments. The aim is to make this work continuous from year to year, so that a definite course will have been covered in a series of years. This is practicable, because the same men are employed as Instructors from year to year, to a large extent, although this year two new men are engaged for the coming season.

One day of the course was expanded into a Cheesemakers' Convention. Practical lessons in scoring cheese and butter were given in the forenoon by Mr. I. W. Steinhoff, Stratford. Lectures were given by Prof. C. F. Doane of the United States Department of Agriculture, and by Messrs. J. N. Paget, Canboro, and Frank Herns, London, Chief Dairy Instructor. Although the attendance was not large, all were much interested and profited by the lessons of the day. The addresses were particularly strong and calculated to cause factory men to think.

The attendance at the milk and cream testing course was disappointingly small. The instructors who are going among the creameries and cheeseries say that the majority of the makers are very much in need of the instruction which is given in this testing course, yet the response has been very feeble for the three years during which the opportunity to get practical lessons on testing has been offered. It seems doubtful if it will be advisable to continue a course for which there appears to be so little demand.

During the term Mr. C. H. Ralph, who has been Assistant Cheese Instructor in the Dairy School, and Demonstrator in Cheesemaking on the College Staff for a number of years, severed his connection with the College to accept a more lucrative position in commercial work in the United States. We take pleasure in testifying to Mr. Ralph's efficiency during the many years he has been connected with the Dairy Department of the College, and wish him success in his new field.

We were fortunate in securing the services of Mr. Alex. McKay, permanently in connection with our cheese work. Mr. McKay's years of experience as a practical cheesemaker and instructor among the factories, together with several years' experience as instructor in the Dairy School, will make him a valuable man on the Dairy Staff.

Two other members of the dairy instructors and demonstrators have signified their intention of engaging in commercial work at the end of the present year. If we wish to secure, and hold, good men it will be necessary to pay higher salaries than has been the custom up to the present.

H. H. DEAN.

EASTERN DAIRY SCHOOL, KINGSTON.

Director.

G. A. Putnam, B.S.A., Department of Agriculture, Toronto.

Staff.

G. G. Publow	Supt. and Lecturer in Cheesemaking.
J. H. Echlin	Instructor in Cheesemaking.
D. J. Cameron	Assistant in Cheesemaking.
L. A. Zufelt	Instructor in Buttermaking.
J. Buro	Instructor in Separators.
W. W. Dool	Assistant in Buttermaking.
J. F. Singleton	Instructor in Milk Testing.
W. T. Connell, M.D.	Bacteriology.
W. O. Walker, M.A.	Dairy Chemistry.
J. A. Craig	Engineer.
Jessie Gordon	Stenographer.

As a result of the cheese factory at Collin's Bay burning during the summer, the school was opened as a creamery on Aug. 27, and was operated as such until Jan. 3. From Jan. 3 till Mar. 26, the milk was purchased by the school, and after Mar. 26 the school was again operated as a creamery, and will continue as such during the summer months.

One result of the school opening as a creamery in August has been an improved milk supply. It has been received not only in better condition, but also more uniform in quantity and more regularly.

During the previous two sessions of the school, no short courses have been given, the long course covering January, February and March. Students who found it impossible to take the entire course, were free to come and go as they wished. It has been felt that this was not best for either the students taking the full course or those taking only part of it, and for this reason the long course was shortened during the past session, and a short course was added to the calendar.

The long course opened Jan. 3 and closed Mar. 9. Forty-nine students registered for this course. The work of this course includes lectures and practical work in cheese making, operation of cream separators, butter making, and milk testing, as well as lectures in bacteriology, chemistry, and cheese factory and creamery accounting. Examinations, both written and practical, were held at the close of this course. An effort has been made to make the school as strong as possible along practical lines.

The short course opened Mar. 16 and closed Mar. 30. Twenty-six students registered for this course. The purpose of the short course is to enable students who cannot take the long course to attend the school for a short time and get training and information along any line desired.

The instructors' course opened Mar. 31 and closed April 8. The twenty-five instructors of Eastern Ontario registered for this course. The object of calling the instructors together is to discuss the problems likely to be met in the different syndicates, and to make any changes necessary in the arrangement of the groups. As a result of this meeting there is more uniformity throughout the district.

This makes the entire registration of one hundred students, an increase of fourteen over that of last year.

G. G. PUBLOW.

ANNUAL REPORTS
OF THE
Live Stock Associations
OF THE
PROVINCE OF ONTARIO
1909.

Dominion Cattle Breeders' Association
Dominion Sheep Breeders' Association
Dominion Swine Breeders' Association
Ontario Poultry Associations
Provincial Winter Fairs
Ontario Horse Breeders' Association and Exhibition

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1909.

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TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present herewith for the consideration of His Honour the Reports of the Live Stock and Poultry Associations for 1909; also the Reports of the Provincial Winter Fairs, and of the Ontario Horse Breeders' Association.

Respectfully submitted,

JAMES S. DUFF,
Minister of Agriculture.

TORONTO, 1909.

CONTENTS.

DOMINION CATTLE BREEDERS' ASSOCIATION :

PAGE
Officers' Report 7
Financial Statement 10
Officers for 1909 11

DOMINION SHEEP BREEDERS' ASSOCIATION :

Annual Meeting 13
Report of Directors 14
Financial Statement 16
Officers for 1909 17
Expert Judges for Sheep for 1909 18

DOMINION SWINE BREEDERS' ASSOCIATION :

Directors' Report 20
Financial Statement 22
Officers for 1909 24
Expert Judges for Swine for 1909 25

WESTERN ONTARIO POULTRY ASSOCIATION :

Annual Meeting 27
Officers for 1909 27
Financial Statement 28
Directors' Meeting 28
Judges recommended for Provincial Winter Fair 29

EASTERN ONTARIO POULTRY ASSOCIATION :

Annual Meeting 29
Officers for 1909 30

THE PROVINCIAL WINTER FAIR :

Public Meeting 31
Address of Welcome : J. P. DOWNEY, M.P.P. 32
Address : W. H. HOYLE, M.P.P. 33
Address : G. C. CREELMAN 37
Fattening Chickens and Demonstration in Trussing : MISS MARY YATES 39
When and How to Hatch : L. H. BALDWIN 44
The Pasteurizing of Whey : FRANK HERNES 45
The Feeding Value of Pasteurized Whey : W. C. SHEARER 49
Cleanliness in the Milk Supply : W. F. STEPHEN 53
How to Increase the Milk Yield : GEORGE RICE 56
Cause and Prevention of Common Ailments in Horses : J. STANDISH, V.S. 63
Treatment of Common Ailments of Horses : J. HUGO REED, V.S. 70
Cause, Prevention and Treatment of Milk Fever in Cattle : H. G. REED, V.S. 77
Cause, Prevention and Treatment of Contagious Abortion in Cattle : H. G. REED, V.S. 82
Cause, Prevention and Treatment of Indigestion in Cattle : H. G. REED, V.S. 85
Cause, Prevention and Treatment of the Common Ailments in Sheep : J. HUGO REED 88
Sheep Scab : J. HUGO REED, V.S. 93
Growing and Handling Wool : T. D. WARDLAW 96
Outlook for the Swine Industry in Ontario : G. E. DAY 106
Alfalfa Growing in Ontario : C. A. ZAVITZ 109
Weeds, Their Identification and Control : GEO. H. CLARK 113
Seed Exhibits : J. BUCHANAN 116

Reports of Judges on Poultry and Poultry Exhibits at Winter Fair, 1908 : PAGE
Jas. A. Tucker 118
R. Oke 119
H. P. Schwab 121
Wm. McNeil 123
L. G. Jarvis 128
W. Cosh 130
S. Butterfield 132
James Anderson 135
Officers and Committees 136
Financial Statement 137

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909 :
Public Meeting 138
Address : MAYOR HOPEWELL 139
Address : DR. R. A. FALCONER 140
Address : JAMES MILLS, LL.D. 144
Address : HON. J. S. DUFF 145
Address : SENATOR D. DERBYSHIRE 147
The Pasteurization of Whey : H. H. DEAN 148
Winter Feeding of Dairy Cows : J. H. GRISDALE 154
Breeding and Rearing Chickens : W. R. GRAHAM 159
What the Raising of more Sheep would mean to Eastern Ontario : A. W. SMITH 160
Economical Feeding of Bacon Hogs : J. H. GRISDALE 161
System in Horse Breeding : JOHN GARDHOUSE 166
Feeding Horses : JOHN BRIGHT 169
How to Select a Heavy Draught Stallion : WM. SMITH 171
How to make Rough Feeding Stuff Most Palatable : ROBERT MILLER 173
Effect of Stable Ventilation on Beef Cattle : J. H. GRISDALE 176
Reports of Judges on Poultry 179
Officers and Committees, 1909-10 185
Financial Statement 186

ONTARIO HORSE BREEDERS' ASSOCIATION :
Report of the Executive 187
Financial Statement 189
Resolutions 189
Election of Directors 190
Exhibition at Union Stock Yards—Prize Lists 191

Dominion Cattle Breeders' Association.

ANNUAL MEETING.

The annual meeting of the Dominion Cattle Breeders' Association was held in the Temple Building, Toronto, February 1st, 1909. The President, JOHN GARDHOUSE, occupied the chair. On motion, the minutes of the previous meeting were taken as read.

OFFICERS' REPORT.

The Secretary read the Officers' Report as follows:—

SHIPMENTS OF PURE-BRED STOCK FROM ONTARIO TO THE WEST: There were seven Association cars of stock shipped to the West in 1908, stock being delivered to sixty-five different points in the west. The first shipment of two cars was made in March, and consisted of 11 horses, 21 cattle, 6 pigs and 1 sheep. The second shipment of two cars left in April, with 4 horses, 23 cattle and 3 hogs. The third shipment, one car, left for the west in June with 6 horses, 8 cattle and 1 sheep. The fourth shipment of two cars started in October and consisted of 1 horse, 22 cattle, 6 hogs and 12 sheep. There is now a balance to the credit of the cars account of $19.44.

The following table shows the total receipts and expenditures in connection with each of the cars:—

	Receipts.	Expenditures.
Shipment of March	$635 01	$655 05
Shipment of April	326 00	317 92
Shipment of June	241 99	259 02
Shipment of October	560 88	571 62
	$1,763 88	$1,803 61

The different breeds of stock were represented in these shipments by the following numbers:—

Breed.	Number in each shipment.				Total Number.
	March.	April.	June.	October.	
Horses :					
Clydesdales	10	2	5	1	18
Hackneys	1				1
Thoroughbreds		2	1		3
Cattle :					
Dexter Kerry				16	16
Ayrshires	6			3	9
Holsteins		11	2		13
Aberdeen-Angus	1	1			2
Shorthorns	14	11	1	2	28
Jerseys			3		3
Herefords			2		2
Galloways				1	1
Swine :					
Berkshires	1	2		6	9
Yorkshires	5	1			6
Sheep :					
Shropshires	1		1	4	6
Hampshires				7	7
Oxford Downs				1	1

In June of 1908, notice was given by the Railroad Companies of the withdrawal of the privilege of partial unloading out of cars shipped to the Western Provinces, pure-bred breeding stock consigned to different points along the direct route to the destination. This privilege had previously been allowed upon payment of a shunting charge of $2. This would materially affect the shipment of stock to the west except when sold in car loads, and as the chief trade in pure-bred stock between Ontario and the west is made up of sales of smaller lots than car loads, these smaller lots could not be delivered except at prohibitive rates. This matter was considered to be so vital to the breeders of pure-bred stock that it was decided to have the President of this Association, together with representatives of other Associations, the Minister of Agriculture and the Dominion Live Stock Commissioner, go to Montreal to ask the Railroad Officials to reconsider the regulation. The mission, we are glad to report, was entirely successsful.

Ontario Pure-Bred Stock Trade: At the last annual meeting of this Association, a suggestion was made that greater efforts should be made by this Association in conjunction with other live stock associations in Ontario, to keep more prominently before probable purchasers in the west, the quality and quantity of pure-bred stock of the different breeds, bred and for sale in this Province. During the past few years a large amount of land has been taken up in the West by persons who are not familiar with conditions in this country, know nothing of Ontario and her pure-bred stock, or consider it too far away to do any business. Ontario is a long distance from the western market, and there are therefore natural conditions to be overcome.

What will first require to be done is to impress western buyers with facts as to the condition of pure-bred stock in the Province of Ontario; second, to provide some means by which persons in the west, who have no personal knowledge of the reputation of Ontario breeders, may be assured of procuring value for money expended; third, to make them thoroughly familiar with the easy and cheap method of transportation by means of the Association cars.

In order that these three things may be accomplished, there would first require to be appointed a representative or representatives in the west, whose business it would be to make western farmers and stockmen more familiar with Ontario conditions; some one who would be present at fairs and exhibitions, visit different districts and keep closely in touch with live stock conditions there, and who would also book orders. There should be advertisements in the prominent agricultural papers in the West, and possibly some of the larger local papers which the representative could arrange for. He would also be in a position to make suggestions as to the best plan to adopt to reach the buyers so as to make the work satisfactory to both buyer and seller. He would also be familiar with the rates and dates of shipment of the Association cars of pure-bred stock, and these should be thoroughly advertised in the West.

One thing will require to be done if this Western trade is to be put on a more satisfactory basis, and that is the cars should be shipped at stated intervals. This would mean however, that sometimes a car would be shipped without a full car load of stock, and the deficit would require to be made up directly out of the funds of the associations. The advantage to the buyer, the seller and the general trade would easily warrant the expenditure.

In Ontario it would be necessary to keep closely in touch with the breeders having stock for sale, the quantity, prices, age, etc. One of the most difficult and at the same time, the most important matters, as the success of the whole matter will depend upon it, is the selection of the stock. This should be done by appointed inspectors, persons in whom everyone would have confidence, located at different points in the Province, so that the travelling expenses would be kept as low as possible.

It is suggested that this work should be organized and arranged by a joint committee, consisting of the executives of the various associations interested, who should be given power to take such action regarding the matter as they may decide upon.

The Ontario Provincial Winter Fair.

Beef cattle.	No. of animals, 1907.	No. of animals, 1908.	Prizes offered, not including specials, 1908.	Special prizes offered, 1908.
Shorthorns	23	24	$ 196	$ 175
Hereford or Aberdeen Angus	13	11	150	132(%)
Galloways or Devons	5	7	150	30
Grades or crosses	22	48	355(x)	370
Export steers	12	3	100	
Dressed carcasses	....	....	200	
Grand championship	....	....	25	
	75	93	1,176	707

(x) Includes special prizes for amateurs paid out of general funds.

(%) Includes $50 offered for champion if won by an animal sired by a pure-bred Aberdeen Angus bull.

The above table shows an increase in the number of entries for 1908, in the Beef Cattle Department, but the entries are not as large as they should be. For the last Show there were $330 offered to amateur exhibitors in addition to several counties offering prizes for amateur exhibitors residing in the county. A number of new exhibitors were encouraged to exhibit on account of these prizes.

Dairy cattle.	No. of animals, 1907.	No. of animals, 1908.	Prizes offered, not including specials.	Special prizes offered.
Shorthorns	7	6	$135 00	$150 00
Ayrshires	14	11	135 50	53 50(x)
Holsteins	12	14	135 00	145 00(x)
Jerseys	....	3	135 00	....
Guernseys	....	....	135 00	....
Grades	2	1	135 00	....
	35	35	$810 50	$348 50

(x) Do not include conditional prizes offered by the Ayrshire and Holstein Associations.

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW.

The following statement shows the number of entries made in the Beef Cattle and Dairy Cattle Departments at the Eastern Ontario Live Stock and Poultry Show at Ottawa, 1909; also the prizes offered in the different classes and the prizes paid:—

Beef cattle.	No. of entries.	Prizes offered.	Prizes paid.
Shorthorns	35	$ 315 00	$ 310 00
Herefords and Aberdeen Angus	....	100 00	....
Galloways and Devons	8	100 00	90 00
Grades or crosses	37	430 00	430 00
Export steers	8	180 00	180 00
Bee carcasses	17	85 00	85 00
	105	$1,210 00	$1,095 00
Dairy cattle.			
Shorthorns	4	$150 00	$ 75 00
Ayrshires	9	284 00	171 50
Holsteins	8	250 00	210 00
Jerseys and Guernseys	....	150 00	....
Grades	8	150 00	140 00
	29	$984 00	$596 50

PROVINCIAL AUCTION SALES OF CATTLE: Provincial Auction Sales of Cattle were held during 1908 at Guelph, Port Perry and Ottawa, on March 4th, March 11th and January 24th, respectively. The following figures show the number of animals sold, total receipts, and the average price at each of these sales:

Guelph: 32 animals sold for $2,160. Average price, $67.50.

Port Perry: 15 animals sold for $1,210. Average price, $80.66.

Ottawa: 16 animals sold for $907.50. Average price, $56.72.

NUMBER OF MEMBERSHIPS RECEIVED THROUGH AFFILIATED ASSOCIATIONS.

Dominion Shorthorn Breeders' Association	1,180
Canadian Ayrshire Breeders' Association	107
Holstein-Friesian Association of Canada	200
Aberdeen-Angus Breeders' Society of Canada	16
Canadian Galloway Breeders' Association	10
Canadian Hereford Breeders' Association	40
Total	1,553

The memberships from the Dominion Shorthorn Breeders' Association and the Canadian Ayrshire Breeders' Association were not paid until after the 31st of December.

FINANCIAL STATEMENT

For the year ending December 31, 1908.

Receipts.

Cash on hand from previous year, as per last report	$286 89
Members' fees	41 00
Membership Fees:	
Canadian Hereford Breeders' Ass'n, 1908	19 00
Galloway Breeders' Ass'n, 1908	5 00
Aberdeen-Angus Breeders' Ass'n, 1908	8 00
Holstein Breeders' Ass'n, 1908	100 00
	$459 89

Expenditures.

Directors' expenses	$32 70
Stationery	1 50
Printing	41 90
Auditor	2 00
Telephone	1 50
Total	$79 60
Balance cash on hand, December 31st, 1908	$380 29

Examined and found correct this 29th day of January, 1909.

(Signed J. M. DUFF, Auditor.

All of which is respectfully submitted.

(Sgd.) JOHN GARDHOUSE,
President.

(Sgd.) A. P. WESTERVELT,
Secretary-Treasurer.

Moved by JOHN GARDHOUSE, seconded by JOHN BRIGHT, "That the Officers' Report as read be adopted." Carried.

The clause in the report dealing with the development of the live stock trade with the West was carefully considered.

Mr. BRIGHT believed that the Western breeders would be opposed to the Association taking an active part in promoting Ontario trade in the West, as they might consider it would be an interference with their own business.

Mr. CLEMONS wished to see the trade encouraged and thought it could be best done by having a careful inspection made of all animals sent to the West to insure the Western breeders getting full value for their money.

Lt.-Col. McCRAE approved of the suggestion in the report of placing the matter in a joint committee's hands.

A. W. Smith wished to have a joint committee consider the matter. In his opinion the Association should not hesitate to advertise Ontario stock and try to supply the demand which is now largely supplied by breeders in the States.

Moved by Mr. Mackie, seconded by Mr. Burt, "That the Executive Committee be appointed to meet with the joint committee from other Associations to consider the development of Western trade in live stock with power to take such action as they consider advisable." Carried.

Mr. T. Porter wished the Association to urge the directors of the Canadian National Exhibition to give more prize money for cattle. He stated that the prize money for the different breeds had been almost stationary for some years, while the expenses of feeding and keeping the stock at the exhibition had greatly increased. He would like to see classes added for animals bred in Canada. In referring to Western trade, Mr. Porter said that he thought Western breeders should come to Ontario for their stock instead of going to the Old Country. In his opinion it was too great a change of climate for animals to be taken direct from the Old Country to the Northwest.

Moved by Lt.-Col. McCrae, "That the executive be a committee to go to the Canadian National Exhibition Directors and urge that larger prizes be given for the different breeds of cattle."

Mr. Mackie stated that he was given to understand the Canadian National Exhibition were intending to give $600 for each class in the cattle department and in addition to this they would duplicate prize money given by breed associations.

A. W. Smith did not think that the executive committee should be sent to the directors of the exhibition, but that the representatives from the different breed associations on the cattle committee would look after the interests they represented.

Lt.-Col. McCrae then withdrew his motion.

Moved by John Bright, and seconded, "That the Secretary be instructed to cast a ballot electing the representatives from the different cattle associations to the Dominion Cattle Breeders' Association, directors of the Dominion Cattle Breeders' Association for 1909. " Carried.

Moved by Lt.-Col McCrae, seconded by A. W. Smith, "That the President consult with presidents of the other associations and the Department of Agriculture to arrange the appointment of an auditor." Carried.

Mr. Dods, Secretary, Union Stock Yards Company addressed the meeting, and explained the plans of the Stock Yards Company with reference to accommodation for shows and sales. He wished to secure co-operation and assistance of members of the Association.

Moved by A. W. Smith, seconded by Lt.-Col. McCrae, "That in view of the action taken by the Association last year and the small number of members present, no action be taken with regard to the Union Stock Yards." Carried.

The meeting then adjourned.

OFFICERS DOMINION CATTLE BREEDERS' ASSOCIATION.

President	John Gardhouse, Highfield.
Vice-President	W. W. Ballantyne, Stratford.
Secretary-Treasurer	A. P. Westervelt, Toronto.

Directors.

Shorthorns	John Isaac, Markham. Arthur Johnston, Greenwood.
Herefords	W. H. Hunter, Orangeville. R. J. Mackie, Oshawa.
Aberdeen-Angus	A. McKinnon, Hillsburg. J. W. Burt, Coningsby.
Galloways	Robert Shaw, Brantford. D. McCrae, Guelph.
Ayrshires	W. W. Ballantyne, Stratford. W. F. Stephen, Huntingdon, Que.
Holstein-Friesian	B. Mallory, Belleville. G. W. Clemons, St. George.
General Director	John Gardhouse, Highfield.
Ontario Agricultural College	Pres. G. C. Creelman. Prof. G. E. Day.

Representatives to Fair Boards.

Canadian National Exhibition	John Gardhouse, Highfield.
Central Canada Exhibition	A. W. Smith, M.P., Maple Lodge. R. Ness, Howick, Que.
Western Fair	Capt. T. E. Robson, London. A. W. Smith, M.P., Maple Lodge.
Ontario Provincial Winter Fair	Arthur Johnston, Greenwood. John Bright, Myrtle. W. W. Ballantyne, Stratford. R. S. Stevenson, Ancaster.
Eastern Ontario Live Stock and Poultry Show	John Gardhouse, Highfield. J. H. Grisdale. Ottawa. Peter White, Pembroke. W. F. Stephen, Huntingdon, Que.

(A list of members of the Dominion Cattle Breeders' Association is published in the Appendix to this Report.)

Dominion Sheep Breeders' Association.

ANNUAL MEETING.

The annual meeting of the Dominion Sheep Breeders' Association was held in the Temple Building, Toronto, February 5th, 1909, at 1.30 p.m.

Moved by A. W. Smith, seconded by Jno. Gardhouse, "That as the Minutes of the last meeting have been published in the annual report, they be taken as read." Carried.

The President, John Campbell, occupied the Chair, and made the following remarks:—

A year ago, when we gathered at our annual meeting, we were congratulating each other on the splendid prosperity which we were then enjoying in our business, and with scarcely an exception, all signs for the future were bright and cheering. The trade in registered sheep had been, the previous season, one of the very best on record, while that for finished market lambs was all that could be desired. But, suddenly, and with nearly a clear sky, there fell in the following June, a "bolt from the blue." After some little distant murmurings, the after-clap came good and strong. One word explains it all—*scab*—which, together with its effects, caused the havoc. That miserable disease, so easy to be got rid of, was traced to a few consignments of both breeding and market sheep sent to the States. Some were loud in denouncing the American quarantine regulations, and ready to blame the American breeders. But the fault was ours, and what is most provoking, is the fact that a few, a very few, of our breeders, through sheer carelessness, or a worse fault, brought the whole of us to suffer for their misdoings. It is too bad that we, in a moment, found the value of our excellent and valuable flocks cut down to one-half their worth because of the greed of a few.

But dark as the outlook is, it has its "silver lining." While up and down the country, in several counties, the past month, I found the interest in sheep husbandry showing a wonderful increase, and rightly so, because not for twenty past years have the people realized as they now do the important and highly profitable place the band of sheep has on nearly every farm; and in all the years they could not invest in pure-bred flocks to so great an advantage to themselves as is possible this present season. We all feel that though the quarantine against scab and foot and mouth diseases have materially affected our trade for the present, yet it may and will prove to the country's advantage, if the people generally will waken up to see their present opportunity of buying when the bargain counters have choice goods marked down to much below value.

Let us take heart. This setback may prove a great blessing in disguise. Years ago we were despairing because American tariffs shut our barley out of that market. They certainly did not profit from their action, while as surely we profited from their doings. Losing that market for our barley brought about a far more profitable industry, the bacon hog trade. So may it be, and, I believe, so it can be made to be, in the present crisis. Let us not spare the knife, but use it freely on all but the best of our ram lambs the coming spring. Let us cull to the limit, and so continue raising the standard of our ideal of flocks till we reach such perfection that the great nation to the south of us will be compelled, by the super-excellence of our sheep, to visit us to get the new blood which they must have to invigorate their flocks.

This is one of the most important gatherings of Canadian sheep breeders which ever convened. Let us face the situation calmly and with courage, then looking back, we may probably consider this day as one above all others,on which the welfare of our industry in a large measure depended.

REPORT OF THE DIRECTORS.

The directors submitted the following report:

Records: The Financial Statement this year shows a balance on hand of $2,362.72. Of this amount, $503.68 has been charged against the Association by the record committee, which when paid will leave a balance of $1,859.04 to the credit of the Association. Provision should be made out of this amount for the publication of the record. The balance would be available to distribute among the various Provinces, in accordance with the provision made by the Association in 1907. This was that the profits from registration should be equitably divided among the various Provincial Associations for sheep in accordance with the number of registrations for each Province.

The monthly receipts on account of the Sheep Records are as follows:

January, 1908	$88 50	August	$271 30
February	51 50	September	190 84
March	105 85	October	122 55
April	39 90	November	101 15
May	51 90	December	144 35
June	57 25		
July	89 75		$1,314 84

The statement of registrations according to the Provinces is as follows:

Province.	Registrations.	Transfers.	Duplicate and New Certificates.
Ontario	1,021	77	5
Manitoba	34	2	
Saskatchewan	19		
Alberta	92	4	
British Columbia	60	9	
Quebec	784	97	8
New Brunswick	24		
Nova Scotia	23		
Prince Edward Island	3	1	
	2,060	190	13

It is recommended that $1,000 be reserved for printing the record and that the work be proceeded with at once. This would still leave a balance of $859.04. It is further recommended that this amount should be divided according to the number of registrations among the different Provinces as follows:

Ontario	$425 27	New Brunswick	$10 08
Manitoba	14 17	Nova Scotia	9 59
Saskatchewan	7 92	Prince Edward Island	1 71
Alberta	38 36		
British Columbia	25 02		$859 04
Quebec	326 92		

The number of memberships from each Province for 1908, is as follows:

Ontario	94	British Columbia	3
Manitoba	5	Quebec	112
Saskatchewan	2	Maritime Provinces	4
Alberta	...		

ONTARIO PROVINCIAL WINTER FAIR: The following statement shows the number of entries in the classes for sheep at the Winter Fair at Guelph, 1908, together with the prize money offered in each class and the amount paid:

Class.	No. of entries.	Prizes offered.	Prizes paid.
Cotswolds	29	$131 00	$129 00
Lincolns	28	131 00	129 00
Leicesters	41	131 00	131 00
Oxfords	43	131 00	131 00
Shropshires	30	131 00	127 00
Southdowns	25	131 00	124 00
Dorset Horns	14	104 00	97 00
Hampshires and Suffolks	9	63 00	63 00
Grades or Crosses	45	152 00	152 00
	264	$1,105 00	$1,083 00

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW: The following statement shows the number of entries in the classes for sheep at the Eastern Ontario Live Stock and Poultry Show of 1909, the amount of prize money offered, and the amount paid:

Class.	No. of entries.	Prizes offered.	Prizes paid.
Cotswolds	12	$89 00	$72 00
Lincolns	12	86 00	86 00
Leicesters	3	89 00	23 00
Oxfords	9	89 00	64 00
Shropshires	23	86 00	86 00
Southdowns	19	89 00	86 00
Dorset Horns	9	89 00	64 00
Hampshires and Suffolks	6	74 00	46 00
Grades and Crosses	43	89 00	89 00
	136	$780 00	$616 00

SHIPMENTS OF PURE-BRED STOCK FROM ONTARIO TO WESTERN CANADA.

(See clause under this heading in the report of the Dominion Cattle Breeders' Association, page 7).

ONTARIO PURE-BRED STOCK TRADE. (See clause under this heading in the report of the Dominion Cattle Breeders' Association, page 8).

FINANCIAL STATEMENT.

For the year ending December 31st, 1908.

Receipts.

Cash on hand from previous year as per last report	$1,497 52
Members' Fees	229 00
Registration Fees	1,118 84
Interest	47 04
Membership, American Shropshire Association, 1908	60 00
Total	$2,952 40

Expenditures.

Directors' Expenses	$76 15
Postage and Stationery	1 50
Printing	58 75
Refund Fees	27 70
Expenses of Delegates to Fair Boards	28 25
American Shropshire Association	393 60
Auditor	2 00
Telegrams	1 73
Total	$589 68
Balance cash on hand	$2,362 72

Examined and found correct, this 30th day of January, 1909.

(Signed) J. M. DUFF,
Auditor.

All of which is respectfully submitted,

Signed on behalf of the directors,

JOHN CAMPBELL, *President.*
ANDREW WHITELAW, *Vice-President.*
A. P. WESTERVELT, *Secretary-Treasurer.*

Moved by Lt.-Col. MCCRAE, seconded by JOHN GARDHOUSE, "That the Directors' Report be received and adopted." Carried.

Lt.-Col. MCCRAE gave a report for the Committee that went to Ottawa with reference to the duty on wool. The Committee interviewed the officials at Ottawa, including the Minister of Customs. They were surprised that the officials knew so little regarding the quantity of wool that came into Canada. The duty is supposed to be levied on certain kinds of wool, and although large quantities of this wool is being imported, only a few dollars had been paid in as duty during the last year. The Minister of Customs assured the Committee that the matter would be looked into, and stated that nothing could be done at that Session of Parliament.

Mr. LLOYD-JONES was pleased to know that more interest was being taken in the question of the duty on wool. He stated that Canadians were not in a position to compete with the wool growers in southern countries.

Mr. HARDING wanted to see an expert appointed to examine all wool coming into Canada to decide what wool comes into competition with Canadian wool and what wool should have duty paid on it.

A. W. SMITH advised the careful consideration of the matter as it must be considered from the standpoint of both the producer of wool and the user of clothing, as well as the manufacturer. To increase the duty on wool would mean that the cost of clothing would be increased.

Moved by J. G. HANMER, seconded by Lt.-Col. MCEWEN, "That the same Committee as last year, namely, Lt.-Col. McCrae, R. H. Harding, Jas. Bowman and J. M. Gardhouse, be reappointed to further consider the wool question, and that the name of John Campbell be added to the Committee." Carried.

Mr. E. B. Bigger addressed the meeting, and explained with some detail, the wool industry from the manufacturer's standpoint.

Moved by John Gardhouse, seconded by Lt.-Col. McEwen, "That the Committee above named be instructed to appoint a small Committee, acting, if necessary, with a small Committee representing the woolen goods manufacturers, to request the Dominion Minister of Agriculture to arrange for a conference between wool growers and woolen goods manufacturers." Carried.

Moved by Lt.-Col. McCrae, seconded by John Gardhouse, "That this meeting express to Dr. Rutherford and Mr. Spencer their hearty appreciation of the admirable Bulletin which they have prepared on the sheep industry." Carried.

Moved by R. H. Harding, seconded by Andrew Whitelaw, "That the Winter Fair Board be requested to require that sheep exhibited at the Winter Fair must be owned by the exhibitor from the time of making entry instead of for three months previous to the Show." Carried.

Dr. Rutherford stated that after the meeting of the Directors of the Association last August, he had made two trips to Washington to interview the authorities there with regard to the sheep quarantine. He stated that up to the time of the outbreak of foot and mouth disease, negotiations were proceeding quite favorably. After that time he had been unable to obtain any further consideration of the matter by the United States officials. Dr. Rutherford stated that so far as he knew no sheep scab existed in Ontario at the present time. As soon as the embargo on account of the foot and mouth disease was raised, negotiations would be resumed with regard to raising of the quarantine on Canadian sheep for breeding purposes entering the United States.

Moved by Lt.-Col. McCrae, seconded by James Snell, "That the thanks of this meeting be tendered to Dr. Rutherford and his staff for the efficient work they have done in eradicating scab, and, that inasmuch as scab is not now known to exist in the Dominion of Canada, that further action towards the removal of the American quarantine be left in Dr. Rutherford's hands." Carried.

Notice was given by A. W. Smith of amendments to the Constitution to be made at the next annual meeting.

Moved by J. Lloyd-Jones, seconded by R. H. Harding, "That whereas it is advisable that working terms be arranged between The Canadian National Live Stock Records and the several American Sheep Record Associations. It is resolved that we, the Members of the Dominion Sheep Breeders' Association, urge upon the Record Board the necessity of making some arrangement, if possible, whereby sheep can be recorded in both the Canadian and American records so that only one certificate and one ear label will be required." Carried.

OFFICERS FOR 1909.

President	Andrew Whitelaw, Guelph.
Vice-President	J. G. Hanmer, Brantford.
Secretary-Treasurer	A. P. Westervelt, Toronto.

Directors.

Cotswolds	Lt.-Col. D. McCrae, Guelph.
Leicesters	James Snell, Clinton.
Hampshires and Suffolks	John Kelly, Shakespeare.
Southdowns	John Jackson, Abingdon.
Dorset Horns	R. H. Harding, Thorndale.
Lincolns	J. T. Gibson, Denfield.
Oxfords	J. E. Cousins, Harriston.
Shropshires	C. W. Gurney, Paris.
Ontario Agricultural College	Prof. G. E. Day, Guelph.
General Directors	W. H. Gibson, Beaconsfield, Que. A. W. Smith, Maple Lodge.
National Live Stock Association	Andrew Whitelaw, Guelph. J. G. Hanmer, Brantford.

Delegates to Fair Boards.

Canadian National Exhibition: Hon. John Dryden, Toronto; J. G. Hanmer, Brantford.

Central Canada Exhibition: N. F. Wilson, Cumberland.

Western Fair, London: Lt.-Col. R. McEwen, Byron; Geo. Telfer, Paris.

Provincial Winter Fair: A. W. Smith, Maple Lodge; John Jackson, Abingdon; Lt.-Col. R. McEwen, Byron; Robert Miller, Stouffville.

Eastern Ontario Live Stock and Poultry Show: Andrew Whitelaw, Guelph; W. A. Wallace, Kars; R. Richardson, South March; N. F. Wilson, Cumberland.

Winnipeg Industrial Exhibition: F. W. Brown, Portage la Prairie; Geo. Allison, Burnbank, Man.

Vice-Presidents representing different Provinces:

British Columbia	A. C. Aitken, Duncans, B.C.
Alberta	Bryce Wright, DeWinton, Alta.
Saskatchewan	Paul Bredt, Regina, Sask.
Quebec	H. E. Williams, Knowlton, Que.
New Brunswick	T. A. Peters, Fredericton, N.B.
Nova Scotia	M. Cumming, Truro, N.S.
Prince Edward Island	Cephus Nunn, Winsloe Road, P.E.I.

EXPERT JUDGES FOR SHEEP, FOR 1909.

Cotswolds: T. Hardy Shore, Glanworth; R. Miller, Stouffville; S. J. Lyons, Norval; Val. Fitcht, Oriel; Jas. Underhill, Claremont; F. Bonnycastle, Campbellford; Prof. G. E. Day, Guelph; Geo. Green, Fairview; J. C. Snell, London; John Rawlings, Ravenswood; Wm. Thompson, Uxbridge; Jno. Park, Burgessville; Robert Vance, Ida; Geo. Laird, Guelph.

Judges nominated for Toronto: S. J. Lyons, Norval; Prof. G. E. Day, Guelph.

Judges nominated for London: S. Dolson, Alloa; Robert Vance, Ida.

Judges nominated for Chicago: Prof. G. E. Day, Guelph; Robert Miller, Stouffville.

Leicesters: R. J. Garbutt, Belleville; Jas. Fennell, Bradford; H. B. Jeffs, Bond Head; A. E. Archer, Warwick; Geo. Whitelaw, Guelph; T. Hardy Shore, Glanworth; Abraham Easton, Appleby; E. Wood, Appleby; Wm. Parkinson, Eramosa; E. Parkinson, Eramosa; John Orr, Galt; Wm. McIntosh, Burgoyne; R. Eastwood, Mimico; John Kelly, Shakespeare; Andrew Thompson, Fergus; J. K. Campbell, Palmerston; J. C. Snell, London; G. B. Armstrong, Teeswater; Jno. Gibson, Denfield; C. E. Wood, Freeman; Jos. Gaunt, St. Helen's; J. M. Gardhouse, Weston; Andrew Whitelaw, Guelph; Wm. Whitelaw, Guelph; R. G. Martin, Marysville; A. W. Smith, Maple Lodge; H. G. Arnold, Maidstone; John Marshall, Cass City, Mich.; J. W. Murphy, Cass City, Mich.; Prof. Curtis, Ames, Ia.; Geo. Penhale, Exeter; Prof. G. E. Day, Guelph; M. Kennedy, Northwood; D. Lillico, Ayr; Jas. Douglas, Caledonia; Frank Shore, White Oak; John Gardhouse, Highfield; Wm. Beattie, Wilton Grove; A. J. McKay, Ailsa Craig; A. Hastings, Crosshill; J. Hastings, Crosshill; A. Deering, Crosshill; Jas. Snell, Clinton.

Judges nominated for Toronto: J. M. Gardhouse, Weston, or R. J. Garbutt, Belleville.

Judges nominated for London: Wm. Douglas, Tuscarora or J. T. Gibson, Denfield.

Judges nominated for Winter Fair: Jas. Douglas, Caledonia.

Judges nominated for Chicago: C. E. Wood, Freeman, or J. M. Gardhouse, Weston.

Note: Where two Judges are given, the first-named Judge is the first choice of the Association.

DORSETS: John Kelly, Shakespeare; Robert Miller, Stouffville; J. M. Gardhouse, Weston; John Campbell, Woodville; J. G. Hanmer, Brantford; Prof. Curtis, Ames, Ia; Thos. W. Hector; Springfield-on-Credit; G. P. Everett, Mt. Vernon; H. N. Gibson, Delaware; E. O. Denton, Somerset, N.Y.; G. McKerrow, Sussex, Wis.; John Jackson, Abingdon; Fred Silversides, Uxbridge; R. H. Harding, Thorndale.

Judges nominated for Toronto: John Campbell, Woodville; A. S. Forster, Oakville.

Judges nominated for London: J. G. Hanmer, Brantford; (Reserve) J. M. Gardhouse, Weston.

SOUTHDOWNS: John Jackson, Abingdon; W. H. Beattie, Wilton Grove; W. H. Gibson, Beaconsfield, Que.; H. N. Gibson, Delaware; Robert Miller, Stouffville; Geo. Telfer, Paris; J. G. Hanmer, Brantford; J. C. Duncan, Orchard Park, N.Y.; Robert McEwen, Byron; H. L. Compton, Monroe, Ohio; Frank Klienhientz, Madison, Wis.; Prof. G. E. Day, Guelph; James Telfer, Paris; George Allen, Paris.

Judge nominated for Toronto: Frank Klienhientz, Madison.

Judge nominated for London: W. H. Beattie, Wilton Grove.

OXFORDS: Prof G. E. Day, Guelph; John Harcourt, St. Ann's; Smith Evans, Guelph; Jas. Tolton, Walkerton; R. J. Hine, Dutton; Henry Arkell, Arkell; Wm. Dickson, Mildmay; J. H. Jull, Mt. Vernon; W. J. Arkell, Teeswater; Jno. E. Cousins, Harriston; Arch. McKenzie, Corwhin; R. E. Birdsall, Birdsall; J. C. Cooper, Picton; Wm. Newman, Cherry Valley; Wm. Arkell, Teeswater; L. Parkinson, Eramosa; S. C. Ketchen, Bloomburg; W. Lee, Simcoe; Prof. M. Cumming, Truro, N. S.; Walter Elliott, Kelso; J. E. Cerswell, Bond Head; Prof. R. Wade, O.A.C., Guelph; Jas. Thompson, Jr. Mildmay; A. Stevenson, Atwood.

Judges nominated for Toronto: Henry Arkell, Arkell, (Reserve) John Harcourt, St. Ann's.

Judges nominated for London: J. E. Cousins, Harriston; (Reserve) J. E. Birdsall, Birdsall.

Judges nominated for Ottawa: T. R. Arkell, Ottawa.

Judge nominated for Winter Fair: J. E. Cousins, Harriston.

HAMPSHIRES AND SUFFOLKS: R. Gibson, Deleware; Henry Arkell, Arkell; W. H. Beattie, Wilton Grove; James Bowman, Guelph; John Kelly, Shakespeare; Geo. L. Telfer, Paris; Prof. G. E. Day, Guelph; H. N. Gibson, Deleware; W. H. Arkell, Guelph; W. R. Bowman, Mount Forest; Jno. Campbell, Woodville; R. J. Stone, Stonington, Ill.; J. Milton, Marshall, Mich.; Harry Thornton, Warren, Ind.; Frank Klienhientz, Madison, Wis.

Judges nominated for Toronto: Henry Arkell, Arkell; Prof. H. S. Arkell, St. Anne de Bellevue, Que.

Judges nominated for London: Prof. G. E. Day, Guelph; Jno. Gibson, Denfield; John Campbell, Woodville.

SHROPSHIRES: W. H. Beattie, Wilton Grove; R. Miller, Stouffville; J. G. Hanmer, Brantford; J. Campbell, Woodville; D. G. Hanmer, Burford; W. G. Pettit, Freeman; D. J. Campbell, Woodville; H. N. Gibson, Millbrook, N.Y.; Geo. Hindmarsh, Ailsa Craig; C. W. Gurney, Paris; J. Miller, Brougham; H. Hanmer, Burford; J. C. Duncan, Orchard Park, N.Y.; Prof. G. E. Day, Guelph; A. Shields, Caistorville; Geo. Crawford, Minesing; John Lloyd-Jones, Burford; W. D. Monkman, Bond Head; W. A. Dryden, Brooklin.

Judges nominated for Toronto: J. C. Duncan, Orchard Park, N. Y.; (Reserve) H. N. Gibson, Millbrook, N.Y.; (Reserve) W. H. Beattie, Wilton Grove.

Judges nominated for London: J. Shields, Caistorville; (Reserve) Geo. Hindmarsh, Ailsa Craig.

Judge nominated for Ottawa: D. G. Hanmer, Burford.

Judges nominated for Winter Fair: J. C. Duncan, Orchard Park, N. Y.; (Reserve) Prof. G. E. Day, Guelph.

Judges nominated for Calgary: Medium and Shortwools, J. C. Duncan, Orchard Park, N.Y.; (Reserve) Prof. G. E. Day, Guelph.

LINCOLNS: John Gardhouse, Highfield; Leonard Parkinson, Eramosa; Robt. Robson, Ilderton; J. H. Patrick, Ilderton; E. Parkinson, Eramosa; Herbert Lee, Highgate; Prof. G. E. Day, Guelph; D. Campbell, Strathburn; John T. Gibson, Denfield; Graham Walker, Ilderton; Wm. Oliver, Avonbank; John Mitchell, Glencoe.

Judge nominated for Toronto: John Gardhouse, Highfield.

Judge nominated for London: Herbert Lee, Highgate.

Judge nominated for Ottawa: Leonard Parkinson, Eramosa.

Judge nominated for Winter Fair: John Gardhouse, Highfield.

(A list of members of the Dominion Sheep Breeders' Association is published in the appendix to this Report.)

Dominion Swine Breeders' Association.

ANNUAL MEETING.

The annual meeting of the Dominion Swine Breeders' Association was held in the Temple Building, Toronto, February 3, 1909, at 9.30 a.m.

The President, D. C. Flatt, occupied the chair.

On motion the minutes of the last meeting were taken as read and adopted.

DIRECTORS' REPORT.

The Secretary read the Directors' Report as follows:—

Swine Records: The number of registrations for the different breeds appearing in Volume 19 of the Record is as follows:

Berkshires	1,475	Tamworths	317
Yorkshires	2,126	Duroc-Jerseys	23
Chester Whites	421	Essex	30
Poland Chinas	43		

Registrations: The Statement of Registrations according to the Provinces is as follows:

Province.	Registrations.	Transfers.	Duplicate and New Certificates.	Members (Pd. at Ottawa.)
Ontario	2,135	191	12	145
Manitoba	555	77	8	63
Saskatchewan	299	49	4	45
Alberta	238	35	5	32
British Columbia	99	5	....	7
Quebec	859	81	5	63
New Brunswick	79	3	....	9
Nova Scotia	86	3	....	4
Prince Edward Island	77	15	....	9
United States	12	....	1	1
Totals	4,439	459	35	378

The monthly receipts for 1908, on account of the Swine Records at Ottawa, are as follows:

January	$335 25	August	418 00
February	262 80	September	332 90
March	240 00	October	213 35
April	212 90	November	218 50
May	257 65	December	357 45
June	260 45		
July	312 75		$3,422 00

GRANTS TO PROVINCIAL ASSOCIATIONS.

The following amounts have been paid to the Provincial Associations, out of profits on registrations and memberships for 1907:

Manitoba	$287 08
Saskatchewan	96 09
Alberta	80 99
British Columbia	36 29
Quebec	345 03
Maritime Provinces	135 74
	$981.22

The names of the Associations and the secretaries to whom the refunds of profits and membership have been paid, are as follows:

Name of Association.	*Name and address of Secretary.*
The Sheep and Swine Breeders' Association of Manitoba	A. W. Bell, Winnipeg, Man.
The Saskatchewan Stock Breeders' Association	J. Breckin, Regina, Saskatchewan.
The Alberta Swine Breeders' Association	E. L. Richardson, Calgary, Alta.
The British Columbia Stock Breeders' Association	F. M. Logan, Victoria, B.C.
The Maritime Stock Breeders' Association	E. B. Elderkin, Amherst, N.S.

Besides the memberships, the profits from registrations for 1908, amount to $186.42. According to the arrangement for the distribution of these profits and memberships, the different provinces have been credited with the following amounts for 1908:

Province.	Number of members paid 1908.	Number of Registrations.	Amount of memberships.	Amount of 1908 memberships refunded.	Amount of 1908 memberships to be refunded.	Profits from Registrations.	Total.
			$ c.	$ c.	$ c.	$ c.	$ c.
Ontario	180	2,135	360 00	....	....	89 90	449 90
Manitoba	65	555	130 00	110 00	20 00	23 37	153 37
Saskatchewan	46	299	92 00	56 00	36 00	12 60	104 60
Alberta	32	238	64 00	34 00	30 00	10 02	74 02
British Columbia	7	99	14 00	6 00	8 00	4 17	18 17
Quebec	90	859	180 00	98 00	82 00	36 17	216 17
New Brunswick	8	79	16 00	20 00	22 00	10 19	52 19
Nova Scotia	4	86	8 00				
Prince Edward Island	9	77	18 00				

In addition to these amounts there is $433.56 of the Ontario surplus unexpended. This is made up of the Ontario surplus of 1907, $556.22, less $122.66 which was spent in 1908, making the total amount available for Ontario, $883.46.

It is recommended that out of the profits for 1908, amounting to $449.90, the following should be paid:

1. To the Ontario Large Yorkshire Swine Breeders' Society, the profits from Yorkshire registrations amounting to $215.67.

2. To the Ontario Berkshire Society, the profits from Berkshire registrations, amounting to $149.75.

From the balance of the profits from Ontario and the Ontario surplus, there should be paid in grants to Fair Associations as follows:—On conditions that the prizes for swine given by these Exhibitions in 1909, should be at least as large as in 1908:

Provincial Winter Fair	$75 00
Canadian National Exhibition	100 00
Western Fair, London	50 00
Eastern Ontario Live Stock and Poultry Show	50 00
Central Canada Exhibition	50 00

This money will be given with the understanding that the prizes for Yorkshires and Berkshire classes at these Shows should not be increased out of these grants.

This will still leave an Ontario surplus of $193.04.

SHIPMENTS OF PURE-BRED STOCK FROM ONTARIO TO WESTERN CANADA.

(See clause under this head in the report of the Dominion Cattle Breeders' Association, page 7).

ONTARIO PROVINCIAL WINTER FAIR.

The following table shows the number of entries in 1908 in the different classes, together with the amount of prize money offered and won:

Class.	No. of entries.	Prizes offered.	Prizes paid.
Yorkshires	52	$309 00	$304 00
Berkshires	54	151 00	151 00
Tamworths	31	151 00	151 00
Chester Whites	13	124 00	108 00
Grades or Crosses	48	120 00	120 00
Bacon Hogs	43	305 00	305 00
	241	$1,160 00	$1,139 00

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW.

The statement below shows the number of entries, the prizes offered and the prizes won at the Eastern Ontario Live Stock and Poultry Show of 1909:

Class.	No. of entries.	Prizes offered.	Prizes paid.
Yorkshires	26	$114 00	$114 00
Berkshires	11	84 00	45 00
Tamworths	16	89 00	85 00
Grades or Crosses	22	89 00	80 00
Export Bacon Hogs	15	185 00	185 00
	90	$561 00	$509 00

ONTARIO PURE-BRED STOCK TRADE.

(See clause under this head in the report of the Dominion Cattle Breeders' Association, page 8).

FINANCIAL STATEMENT.

For the year ending December 31st, 1908.

Receipts.

Cash on hand from previous year, as per last report	$3,037 47
Membership fees	870 00
Registrations	2,672 00
Interest	44 90
Miscellaneous	1 00
	$6,625 37

Expenditures.

Directors' and Committee's expenses		$266 10
Balance of amount paid to Record Committee for 1907		166 01
Amount paid to Record Committee, 1908		1,200 00
Refund fees		110 35
Printing and Binding Records		744 90
Printing and Stationery		41 10
Grants:		
Manitoba		397 08
Quebec		345 03
British Columbia		32 29
Saskatchewan		112 09
Maritime Provinces		91 74
Alberta		72 99
Ontario:		
Large Yorkshire Breeders' Society	$539 97	
Berkshire Breeders' Society	316 47	
Central Canada Exhibition Ass'n., 1908	50 00	
Canadian National Exhibition, 1908	100 00	
Western Fair Association, 1908	50 00	
Eastern Ontario Live Stock and Poultry Show, 1908	100 00	
		1,156 44
Auditor		2 00
Miscellaneous		1 02
Total		$4,739 14
Balance cash on hand		$1,886 23

Examined and found correct, this 30th day of January, 1909.

(Signed) J. M. Duff,
Auditor.

All of which is respectfully submitted.

Signed on behalf of the Directors,

D. C. Flatt, *President.*
Wm. Jones, *Vice-President.*
A. P. Westervelt, *Secretary-Treasurer.*

Moved by Thos. Teasdale, seconded by E. E. Martin, "That the Directors' Report be adopted." Carried.

On motion it was resolved that the Executive Committee be empowered to act with the Executives of the other interested associations to take such action as they deem advisable with reference to western trade in live stock.

The Secretary read a petition that is being circulated among sheep breeders, and also the following motion, which was drafted by a committee appointed by the Directors: Moved by Jos. Featherston, seconded by D. DeCourcy: "That the members of the Dominion Swine Breeders' Association in annual meeting assembled, having learned of a petition about to be presented to the Honourable, the Minister of Agriculture for the Dominion of Canada, asking that the embargo on American hogs coming into Canada should be raised, wish to strongly express our disapproval of such action being taken on account of the great danger of hog cholera being distributed throughout this Province which the careful administration of the Dominion

Department of Agriculture has almost eradicated. It is further resolved that a copy of this resolution be immediately forwarded to the Hon. Sydney Fisher, Minister of Agriculture, and also that the Minister of Agriculture be requested to obtain accurate information as to the calling of each person signing the petition."

In discussing this motion, a number of members expressed their strong disapproval of the action of the sheep breeders who were responsible for the circulation of the petition.

The special committee consisting of Wm. Jones, R. H. Harding, and J. E. Brethour, appointed by the Directors to draft a resolution, presented their report.

Moved by W. H. Durham, seconded by T. A. Cox, "That the Executive be empowered to deal with the recommendation regarding the deputation to Denmark." Carried.

Moved by John Kelly, seconded by H. J. Davis, "That Messrs. D. C. Flatt, Jos. Featherston and J. E. Brethour be a deputation to wait on the Minister of Agriculture regarding the petition of the sheep breeders in case this action is considered advisable." Carried.

D. C. Flatt gave a report of the committee that went to Ottawa to ask that a higher duty be placed on American hogs coming into Canada. He stated that the committee had been kindly received by Hon. Mr. Fisher and Hon. Mr. Patterson. The Ministers informed the deputation that they would be unable to do anything to relieve the situation before the next session of Parliament at least. Mr. Flatt thought that if necessary, the Anti-Dumping clause of the Customs Tariff might be used to keep the hogs from being imported.

Moved by W. H. Durham, seconded by Geo Douglas, "That it is recommended that Judges on swine at all Fairs and Exhibitions should be instructed to use their discretion in discarding animals that in their judgment are not shown in proper class and section for their ages." Carried.

Moved by J. E. Brethour, seconded by R. H. Harding, "That secretaries of Fairs and Exhibitions be given information with regard to the suggestion embodied in the above resoluton." Carried.

Moved by Jos. Featherston, seconded by R. J. Kelly, "That the representatives to the Canadian National Exhibition urge that a class be added for Chester Whites." Carried.

OFFICERS FOR 1909.

President	D. C. Flatt, Millgrove.
Vice-President	Wm. Jones, Zenda.
Secretary-Treasurer	A. P. Westervelt, Toronto.
Executive Committee	D. C. Flatt, Millgrove. Wm. Jones, Zenda. J E. Brethour, Burford. A. P. Westervelt, Toronto.

Directors.

Berkshires	W. H. Durham, Toronto.
Yorkshires	J. E. Brethour, Burford.
Chester Whites	D. DeCourcy, Bornholm.
Poland Chinas	W. M. Smith, Scotland.
Tamworths	Geo. Douglas, Mitchell.
Essex	Jos. Featherston, Streetsville
General Director	R. H. Harding, Thorndale.
Ontario Agricultural College	Prof. G. E. Day, Guelph.

REPRESENTATIVES TO FAIR BOARDS.

Canadian National Exhibition: D. C. FLATT, Millgrove; SAMUEL DOLSON, Norval Station.

Central Canada Exhibition: R. O. MORROW, Hilton; R. J. GARBUTT, Belleville.

Western Fair: GEO. DOUGLAS, Mitchell; R. H. HARDING, Thorndale.

Provincial Winter Fair: Prof. G. E. DAY, Guelph; G. B. HOOD, Guelph; WM. JONES, Zenda; R. H. HARDING, Thorndale.

Eastern Ontario Live Stock and Poultry Show: D. C. FLATT, Millgrove; P. O. COLLINS, Bowesville · J. C. SMITH, Ottawa; W. H. MCNISH, Lyn.

EXPERT JUDGES FOR SWINE FOR 1909.

BERKSHIRES: John Kelly, Shakespeare; J. J. Wilson, Milton; H. Mason, Scarboro; Adam Thompson, Shakespeare; James Hamilton, Shakespeare; Wm. Wilson, Snelgrove; J. C. Smith, Ottawa; X. Plaunt, Northcote; Samuel Dolson, Norval Station; Hugh G. Clark, Georgetown; P. W. Boynton, Dollar; Alex. Smith, Maple Lodge; W. G. Caven, Toronto; Peter McEwen, Kertch; John Boyes, Jr., Churchill; J. C. Snell, London; Thomas Teasdale, Concord; Geo. Green, Fairview; Robert Vance, Ida; T. A. Cox, Brantford; C. R. Decker, Chesterfield; Jos. Barnett, Brooklin; E. E. Martin, Canning; H. B. Jeffs, Bond Head; Wm Linton, Aurora; E. Brien, Ridgetown; W. A. Shields, Milton; D. J. Gibson, Bowmanville; S. J. Lyons, Norval; J. L. Clerk, Norval; Aiken Dolson, Alloa; W. H. Durham, Toronto; Frank Teasdale, Concord; J. Weir, Northfield Centre; J. Lawrence, Oxford Centre; Wm. Coats, Malton; H. Koelln, Glen Allan; S. Lemon, Kettleby; W. W. Brownridge, Oak Grove.

Judges nominated for Toronto: Samuel Dolson, Norval Station; (Reserve) E. E. Martin, Canning.

Judges nominated for London: S. J. Lyons, Norval; Reserve, P. W. Boynton, Dollar.

Judge nominated for Guelph: Thomas Teasdale, Concord.

Judge nominated for Ottawa: H. G. Clark, Georgetown.

YORKSHIRES AND TAMWORTHS: David Barr, Jr., Renfrew; E. A. Kipp, Chilliwack, B.C., Jas. Bray, Longburn, Man.; Lou Rogers, Weston; Geo. D. Betsner, Copetown; R. J. Kerr, Mimosa; J. E. Brethour, Burford; W. R. Bowman, Mount Forest; Wm. Jones, Zenda; R. J. Garbutt, Belleville; R. H. Harding, Thorndale; N. M. Blain, St. George; J. H. Simonton, Chatham; G. North, Marden; A. Elliott, Galt; L. F. Master, Haysville; A. C. Hallman, Breslau; D. G. Hanmer, Burford; A. Laurie, Wolverton; Wm. Davies, Toronto; Richard Gibson, Delaware; Henry Dedels, Kossuth; G. B. Hood, Guelph; F. Shore, White Oak; Jos. Featherston, Streetsville; H. E. Sharp, Ida; A. F. McGill, Hillsburg; J. M. Hurley, Belleville; Geo. Grier, Grand Valley; Jos. Stephen, Trout River, Que.; Jos. Fletcher, Oxford Mills; Robert Nichol, Brussels; A. F. Foreman, Collingwood; Wm. Howe, North Bruce; Prof. G. E. Day, Guelph; H. J. Davis, Woodstock; D. C. Flatt, Millgrove; W. R. McDonald, Ridgetown; W. Elliott, Galt; R. G. Martin, Marysville; J. E. Cousins, Harriston; Geo. Green, Fairview; J. W. Callbeck, Augustine Cove, P.E.I.; J. G. Clark, Ottawa; J. C. Smith, Ottawa; D. Drummond, Ottawa; A. Carey, Millgrove; Jas. Yule, East Selkirk; A. W. Ross, Bromley; J. J. Pearson, Cooksville; R. F. Duck, Port Credit; Duncan Anderson, Rugby; Thos. Hurley, Belleville; J. H. Grisdale, Ottawa; A. A. Colwill, Newcastle; M. Cumming, Truro, N.S.; R. O. Morrow, Hilton; Geo. Douglas, Mitchell; Jas. Douglas, Mitchell; W. A. Trann, Cedar Grove; P. O. Collins, Bowesville; L. Foster, Myrtle; J. G. Foster, Myrtle; J. R. Flatt, Millgrove; J. Duck, Port Credit; Ken. Featherston, Streetsville; J. W. Black, Winnipeg, Man.; Herbert German, St. George; N. Wilson, Fergus; C. Currie, Morriston; Gus. A. Langelier, Quebec; Richard Birch, Anderson; H. Koelln, Glen Allan.

Judges nominated for Toronto: Yorkshires—J. E. Brethour, Burford; R. J. Garbutt, Belleville. Tamworths—J. C. Nichol, Hubrey. Bacon Hogs—J. E. Brethour, Burford; R. J. Garbutt, Belleville; J. C. Nichol, Hubrey.

Judges nominated for London: A. C. Hallman, Breslau; (Reserve) G. B. Hood, Guelph.

Judge nominated for Ottawa: A. A. Colwill, Newcastle.

Judges nominated for Guelph: Pure Breds—A. C. Hallman, Breslau; Prof. Day, Guelph. Bacon Hogs—Wm. Jones, Zenda; J. C. Nichol, Hubrey; R. J. Garbutt, Belleville.

POLAND CHINAS AND DUROC-JERSEYS: L. R. Jarvis, Chatham; G. D. Campbell, Harwich; Mac. Campbell, Harwich, D. C. Flatt, Millgrove; D. DeCourcey, Bornholm; G. B. Hood, Guelph; Geo. Green, Fairview; Wm. Jones, Zenda; W. H. Smith, Scotland; C. A. Smith, Scotland; J. E. Brethour, Burford; R. H. Harding, Thorndale; Geo. Bennett, Charing Cross; Jas. Bennet, South Burton; Jos. Featherston, Streetsville; Prof. G. E. Day, Guelph; Jos. McGarvin, Chatham; R. Willis, Glen Meyer.

CHESTER WHITES: E. D. George, Putnam; R. E. Birdsall, Birdsall; Albert Barachy, Bloomington; Wm. Jones, Zenda; J. C. Snell, London; Geo. Green, Fairview; D. DeCourcy, Bornholm; R. H. Harding, Thorndale; G. B. Hood, Guelph; Gideon Snyder, Jarvis; Jos. Featherston, Streetsville; G. Bennett, Charing Cross; J. C. Nichol, Hubrey; Prof. G. E. Day, Guelph; W. E. Wright, Glanworth; D. C. Flatt, Millgrove; Geo. Douglas, Mitchell; J. C. Smith, Hintonburg; R. J. Garbutt, Belleville.

Judges nominated for London: D. C. Flatt, Millgrove; G. B. Hood, Guelph.

Judges nominated for Toronto: If Chester Whites are shown by themselves, G. B. Hood, but if breeds are shown together, R. J. Garbutt, Belleville.

Judge nominated for Ottawa: A. A. Colwill, Newcastle.

Judge nominated for Guelph: G. B. Hood, Guelph.

ESSEX: H. G. Clark, Georgetown; G. B. Hood, Guelph; R. J. Garbutt, Belleville; R. H. Harding, Thorndale; Wm. Jones, Zenda; James Main, Milton.

(A list of members of the Dominion Swine Breeders' Association is published in the Appendix to this Report.)

Western Ontario Poultry Association.

ANNUAL MEETING.

The annual meeting of the Western Ontario Poultry Association was held in the City Hall, Guelph, on Thursday, December 10th, 1908, at 1.30 p.m. The President, Wm. McNeil, occupied the chair.

The President in opening the meeting thanked the individual members of the Association for the efforts they had put forth in making such a large showing at the Winter Fair. He also referred to the good work done by the Committee who had charge of the special prize list and expressed appreciation of the kindness of specialty clubs in giving special prizes.

The Secretary read the minutes of the last annual meeting and also the minutes of the Directors' meeting. Upon motion of Messrs. **Donovan** and **Barber**, the minutes were adopted as read. The financial statement for the year ending October 31st, 1908, was read.

Moved by Mr. **Bell**, seconded by Mr. **Donovan**, "That the financial statement as read be adopted. Carried.

Moved by Mr. **Donovan**, seconded by Mr. **Crowe**, "That it having come to the knowledge of this Association that the Canadian National Exhibition have ordered plans for the erection of a new poultry building, that this Association wishes to tender a hearty vote of thanks to the Canadian National Exhibition Association, and would, if given an opportunity, have a committee to confer with them as to details." Carried.

Moved by Mr. **Donovan**, seconded by Mr. **Graham**, "That the chair appoint a committee of three to be available to confer with the Canadian National Exhibition." Carried.

The chair named H. B. Donovan, F. A. Woodward and W. R. Graham as the committee.

OFFICERS FOR 1909.

Honorary-Presidents	Hon. **Jas. Duff**, M.P.P., Toronto. Hon. **Nelson Monteith**, Stratford.
President	L. H. **Baldwin**, Toronto.
1st Vice-President	**Richard Oke**, London.
2nd Vice-President	W. J. **Teale**, Guelph.

DIRECTORS

Jos. **Russell**, M.P., Toronto.
A. W. **Tyson**, Guelph.
G. G. **Henderson**, Hamilton.
T. H. **Scott**, St. Thomas.
P. L. **Greer**, Owen Sound.
T. J. **Kiley**, London.
N. K. **Cornwall**, Thamesville.
C. H. **Wilson**, Hawkestone.

Representatives to Canadian National Exhibition: **Wm. McNeil**, London; **Wm. Barber**, Toronto. (Second representative if two can be secured).

Representatives to Provincial Winter Fair: **Wm. McNeil**, London; A. W. **Tyson**, Guelph; L. H. **Baldwin**, Toronto; W. **Tregwin**, St. Mary's.

Moved by Mr. **Jarvis**, seconded by Mr. **Oke**, "That this Association in annual meeting assembled desires to express its sympathy with the wife of our late esteemed and respected past president, Mr. Allan Bogue, and that this resolution be recorded on the minutes and a copy be sent to Mrs. Bogue." Carried.

A hearty vote of thanks was unanimously passed expressing the appreciation of the Association for the good work done by Mr. McNeil during his term of office as President of the Association.

The meeting then adjourned.

FINANCIAL STATEMENT.

For the year ending October 31st, 1908.

Receipts.		*Expenditures.*	
Members' fees	$320 00	Balance due Treasurer as per last report	$12 70
		Directors' expenses	12 90
		Balance of memberships transferred to Winter Fair	307 30
		Total	332 90
		Balance due Treasurer	12 90

Examined and found correct this 9th day of December, 1908.

(Signed) J. M. Duff,
Auditor.

(Signed) Wm. McNeil, *President.*
(Signed) A. P. Westervelt, *Treasurer.*

DIRECTORS' MEETING.

Immediately after the annual meeting the newly elected Directors met, with Mr. Baldwin in the chair.

The Secretary read communications from the Secretary of the Canadian Leghorn Club, the Secretary of the Canadian Game and Game Bantam Association, the Secretary of the Turkey and Water Fowl Club, the Secretary of the Canadian Ornamental Bantam Association. That part of the communication from the Turkey and Water Fowl Club, recommending that in the event of a new building being procured for the next show, that an aisle be provided for turkeys and water fowl, with coops raised off the floor, was referred to the Winter Fair Board.

The following recommendations were made regarding changes in the prize list for the classification of the poultry department for the next show:

1. That as there are about 20 Anconas in the present Show, a separate class should be given for them. (To be classified with the Mediterraneans).
2. That the class for Polands, Buff Laced be changed to read Polands, Buff Laced Bearded.
3. That the class for Game Bantams, Duckwing be divided making a class each for Game Bantams, Golden Duckwing and Game Bantams, Silver Duckwing.
4. That the class for Bantams, White Booted be made into two classes; one for Bantams, White Booted Plain, and one for Bantams, White Booted, Whiskered.
5. That the class for Bantams, Brahma, be divided making classes for Brahma Light and Bantams, Brahma Dark, but if the extra class cannot be added, change the wording of the class to Bantams, Brahma Light and have the Bantams, Brahma Dark show in the Bantams, A.O.V.
6. That a class be added for Mallard Ducks.

7. That the following classes be added to the Pigeon list for birds bred in 1909: Carrier, any color; Pouter, any color; Jacobin, any color; Magpie, any color; Swallow, any color; Owl, African, any color; Owl, English, any color.

8. That the class for Pouter, Pigmy be divided making a class for Pouter, Pigmy, Blue or Black Pied and a class for Pouter, Pigmy, any other color.

9. That there be only one class for Trumpeter to read, Trumpeters, any color.

10. That the class for Jacobin, Red or Yellow be divided making classes for Jacobin, Red and for Jacobin Yellow.

11. That the class for Fantail, Blue or Black be divided making classes for Fantail, Blue and for Fantail, Black.

12. That the class for Magpie, Red or Yellow be divided making classes for Magpie, Red and for Magpie, Yellow.

13. That a section be added to the Sale Class for Pigeons, any variety.

The following judges for the Fair of 1909 were recommended to the Provincial Winter Fair Board:

Plymouth Rocks: H. P. Schwab, Irondequoit, N.Y.

Buff Orpingtons and all Leghorns, except R. C. White: Richard Oke, London.

Spanish, Black and White Orpingtons, Dominiques, Partridge Wyandottes, Javas, La Fleche, Creve-Coeurs: N. Cosh, Box K., Auburn, N.Y.

Games, Game Bantams, Asiatics: S. Butterfield, Windsor.

Ornamental Bantams, Silkies, Sultans: Wm. McNeil, London.

Rhode Island Reds and all Wyandottes, except Partridge: James Tucker, Concord, Mich.

Minorcas, Andalusians and R. C. White Leghorns: J. H. Minshall Brantford.

Polands, Dorkings, Red Caps, Houdans, A.O.V. Fowls, Water Fowl: L. G. Jarvis, Grimsby.

Turkeys: James Anderson, Guelph.

Pigeons: C. F. Wagner, Toronto; Chas. Currier, Toronto.

Ornamentals: Wm. Barber, Toronto.

Utility Pen, Dressed Poultry: Wm. Barber, Toronto; W. R. Graham, Guelph.

Moved by Mr. Henderson, seconded by Mr. Oke, "That the recommendations for changes in the prize list be approved." Carried.

Moved and carried, "That the recommendations for judges be approved."

In connection with the judging of Pigeons, it was suggested that Mr. Currier judge Carriers, Pouters, Barbs, Jacobins and Owls.

The meeting then adjourned.

Eastern Ontario Poultry Association.

ANNUAL MEETING.

The annual meeting of the Eastern Ontario Poultry Association was held in the Lecture Room in the Fair Building, Ottawa, on Thursday Evening, January 22nd, at 7.30 p.m.

The President, George Robertson, was in the chair.

Moved by Mr. Belford, seconded by Mr. John Bogue, "That the minutes of the last meeting be taken as read." Carried.

The Treasurer reported that two memberships had been paid into the Association, and the money was used for the special prizes for Poultry at the Eastern Ontario Poultry Show.

Moved by Mr. Bogue, seconded by Mr. McNeil, "That Clause 5 of the Constitution be amended to read as follows: 'The membership of this Association shall consist of exhibitors at the Eastern Ontario Live Stock and

Poultry Show, whose entry fees in the poultry department amount to one dollar or more'." Carried.

Moved by Mr. Belford, seconded by Mr. Garland, "That Clause 9 of the Constitution and By-laws should be amended to read as follows: 'At the annual meeting each year ten directors shall be appointed from among the general membership of the Association, also one or more auditors, etc.' " Carried.

Moved by Mr. Bogue, seconded by Mr. McNeil, "That Golden Unbearded Polands be put on the prize list, making it read 'Golden Bearded' and 'Golden Unbearded Polands'." Carried.

Moved by Mr. McNeil, seconded by Mr. Bogue, "That 'Silver Unbearded Polands' be added to the prize list, making it read 'Silver Bearded Polands' and 'Silver Unbearded Polands'." Carried.

Moved by Mr. Belford, seconded by Mr. Peaker, "That the prize list be changed so as to read 'Blue Checkered Flying Homers' instead of 'Blue Checkered Show Homers'." Carried.

Moved by Mr. Peaker, seconded by Mr. Belford, "That a section be added for 'Any Other Variety' in the Selling Class, and also that a section be added for 'Ducks' in the Selling Class." Carried.

Moved by Mr. Garland, seconded by Mr. Blakney, "That Black Wyandottes be added to the prize list." Carried.

Moved by Mr. Bogue, seconded by Mr. McNeil, "That 'Sultans' be added to the prize list." Carried.

Moved by Mr. Belford, seconded by Mr. Higman, "That the appointment of Judges be left to the Board of Directors." Carried.

Mr. Higman suggested that Mr. George Robertson be added as one of the Judges in addition to the five who acted this year.

ELECTION OF OFFICERS.

Honorary Presidents	Hon. Sydney Fisher, Ottawa. Hon. J. S. Duff, Toronto. Wm. McNeil, London.
President	George Robertson, Ottawa.
First Vice-President	George Higman, Ottawa.
Second Vice-President	John A. Belford, Ottawa
Secretary-Treasurer	A. P. Westervelt, Toronto

Directors.

Wm. Garland, Hintonburg.
A. W. E. Hellyer, Ottawa.
F. A. James, Ottawa.
J. E. Fidler, Brockville.
C. C. Cornish, Ottawa
R. E. McKinstry, Ottawa.
J. M. Peaker, Ottawa.

Representatives to Fair Boards.

Canadian National Exhibition: George Robertson, Ottawa.

Central Canada Exhibition: John A. Belford, Ottawa.

Eastern Ontario Live Stock and Poultry Show: George Robertson, Ottawa; Geo. Higman, Ottawa; John A. Belford, Ottawa; Wm. Garland, Hintonburg.

R. E. McKinistry, Ottawa, Superintendent.

Moved by Mr. Belford, seconded by Mr. James, "That we recommend to the Eastern Ontario Live Stock and Poultry Show that the expenses of our representative to the Canadian National Exhibition be paid." Carried.

The meeting then adjourned.

THE PROVINCIAL WINTER FAIR.

PUBLIC MEETING.

The Public Meeting, held in connection with the Winter Fair, was held in the City Hall, Guelph, on Wednesday, December 10th, 1908, at 7.30 p.m.

The chair was occupied by Hon. Jas. S. Duff, Minister of Agriculture for the Province of Ontario, and an excellent musical programme was arranged for and rendered under the direction of Capt. T. E. Robson, of London.

The Chairman, in calling the meeting to order, said: "Permit me to express the great pleasure it gives me to occupy the chair to-night and to see the magnificient way in which you have turned out to this public meeting. It augurs well for the future success of the agriculturists of the Province of Ontario to see that year after year an increasing interest is being taken in this Winter Fair. If it did not have an influence for good, do you suppose that men and women would continue to attend it? They know it is good for them to come and it is also good for the neighborhood in which they live that they do come. For, notwithstanding what may be done immediately in connection with this Fair or what may be done by the Directors in charge of the splendid exhibits at this Fair or what efforts may be put forth by the Government, if these things are not backed up by individual efforts on the part of the people, they will be of no value. If we are to advance in our agricultural industries, as I am satisfied we shall, from greater to greater things, it will be through individual influence. If there is a people on the face of the earth to-day who should feel proud of their environment it is the people of the Province of Ontario. We occupy a very unique position, being the premier province in the proudest gem in the diadem of Britain. We have within our borders a population of nearly two and three-quarter millions of people. If we are to continue to hold such a proud position in this beautiful Dominion of Canada we must continue from year to year to be true to the responsibilities devolving upon us. We have everything within our own borders to make us great and prosperous and we are only beginning to realize the possibilities of our natural resources. In the northern part of the Province of Ontario there lies a stretch of land that within the next half century will no doubt be peopled equally as thickly as the southern part of the province. Many of you will be surprised to learn that north of the rocky region where we have the greatest silver camp in the world, away north of Cobalt and beyond the height of land, we have a magnificient clay belt covering between ten and eighteen million acres of land. It might occur to you that this land is too far north, that it is too cold or that it is not the proper sort of soil, but I am convinced, after having been up there a short time ago, that all that beautiful clay belt requires is to have the axe of the woodman take off the forest. When the land is cleared it can very soon be brought into a state of cultivation and the soil and climate are such that this great stretch of country is bound to become one of the best grain growing sections of the Province of Ontario. The demonstration farm which the Government of Ontario has established up there is situated 75 miles farther south than the City of Winnipeg, although it is 475 miles north of Toronto. The country is drained with beautiful rivers and streams and it has everything to make it a beautiful country where magnificient farms may be hewn out of the forest, and as years roll on, instead of taking second place to the north west provinces as some think Ontario will, we will continue to hold our own and will continue to be the premier province of the Dominion.

I am glad to see this splendid audience assembled here this evening. I shall not take up any more of your time as I am sure you are all anxious to hear the other gentlemen whose names appear on the programme.

I shall now call upon Mr. J. P. Downey, the brilliant representative to to the Ontario Legislature from South Wellington to give the address of welcome.

ADDRESS OF WELCOME.

By J. P. Downey, M.P.P., Guelph.

This is about the seventh or eighth consecutive year that I have appeared in response to the invitation of the chairman of this annual meeting to extend a few words of welcome to the visitors within the gates of the Royal City of Guelph. I do not think it is necessary for me to tell you that you are welcome. I do think, however, if there is one element in connection with this Winter Fair that makes the guests of the City of Guelph realize that they are at home here and that the people desire that they shall make themselves at home, it is the gracious courtesy extended by the King's Daughters. There is an atmosphere of hospitality about that Council Chamber that is refreshing and delightful. I desire to express my thanks, as a citizen, to the King's Daughters for the splendid work they are doing. We all desire to extend our congratulations to the worthy gentleman who to-night occupies the position of chairman, congratulations, not alone because he is here in his official capacity for the first time as Minister of Agriculture, but because he is an old friend. When he was not Minister of Agriculture, when he was simply Mr. J. S. Duff, the member for Simcoe, he always evinced a warm feeling for this Winter Fair and this Royal City of Guelph. In the man who went before him, the Hon. Nelson Monteith, the City of Guelph and the Winter Fair had a good friend and we rejoice that this great exhibition has a true and loyal friend in Hon. Mr. Duff.

Some say Guelph is too small and the Fair should be moved to Toronto. I just want to say this, that just because Guelph is the size it is, that is one great reason why this Fair should continue in Guelph. Here there are no attractions to take the attention of the farmers from the Fair. The educational side of this Fair gives it a dignity and practicability that it would not possess were is situated in any other place.

I desire on behalf of the citizens of Guelph to offer you a hearty welcome. May your stay be profitable and pleasant and when you go away may you carry with you good impressions of our city.

REPLIES TO ADDRESS OF WELCOME.

Lieut.-Col. R. McEwen, Byron, President Winter Fair: Allow me, sir, on behalf of the Directors of the Winter Fair Board to thank Mr. Downey and the representatives of the county and the citizens of Guelph for the very cordial welcome they have extended to us. If the citizens of Guelph will look into the faces of the audience present this evening they will have no doubt as to the fact that their welcome is fully appreciated.

I am very glad to be able to announce to you that our show this year is fully equal to anything that it ever has been, and although we have sent champions to Chicago, the building is full in every department with animals exhibiting the highest skill in the breeder's and feeder's art. We had hoped that at this show we would have had greater accommodation and we would have been able to have included horses. Every person who is engaged in farming is interested in horses and I am sure you will agree with me in saying that this addition ought to be made. We find in coming to Guelph that we get closer in touch with one another and our interests seem to be centered under one roof. Other places may possibly make an effort to secure part of this show, but I hope we may yet see a horse department brought to this fair.

Before taking my seat, I wish to congratulate you, sir, upon your appointment. I am sure every farmer will find in you a friend who will look after their interests.

I thank the citizens of Guelph on behalf of the Winter Fair Board for their welcome.

Wm. SMITH, Columbus: I am only going to ask your attention for a moment or two. I feel, Mr. Chairman, as presiding officer of the Ontario Horse Breeders' Association, that I have a right to repeat here to-night what I did this afternoon, and that was to congratulate you upon being called to one of the highest positions in the council of this great Province of Ontario, as Minister of Agriculture, and I hope you will be long spared to preside over this great Department.

Last summer it was thought possible that we would include horses at this Fair, and I must say that if we are going to have any educational features in connection with this show, it must be continued in some town or city like Guelph. If I may be allowed to give you one word of advice, I appeal to you to use your good judgment and secure this show for all time to come. You have had a splendid show in the years past and it should be equally as good in the years to come. Fault has been found in the past with your accommodation, but I am bound to say this, that I do not believe any man, and I do not believe any body of men, or ladies either, can go away from this show and say that every effort has not been made to make them comfortable in every possible way.

ADDRESS.

By W. H. HOYLE, M.P.P., CANNINGTON, ONT.

I assure you that it affords me very great pleasure to be here this evening. This is the first opportunity that has presented itself for me to attend the Provincial Fair in this city. I take it for granted, from the tenor of the musical renditions that we have heard, and also from the speeches, that we may congratulate ourselves that we are all "John Thompson's bairn." As years roll on we are beginning to think less and less of the respective provinces that we hail from. Not that we should forget the provincial interests involved therein, but that our views are broadening and instead of taking a provincial aspect of the affairs of Canada to-day, we are imbued with a national feeling for the building up of this great Dominion of ours, and we love, and honor and revere our public men whether they come from Nova Scotia, from New Brunswick or any of the other provinces.

I am not here as an agriculturist. It is true I represent in the local Legislature an agricultural constituency, and I am identified with all that appertains to agricultural life, not only in the electoral district which I represent, but I believe that it is the abounding duty of each representative in the local Legislature who votes the public revenue, by way of grants to this or that institution, that occasionally he should put in an appearance in order that he might understand and be enabled to vote intelligently on the question of voting moneys that are distributed on behalf of the province in which we take so much pride. With that object in view, I am here, and I propose for a few minutes to take a retrospective view and lead up to a point which I believe will be an additional reason for my being here, because I have every hope and faith that this city will supplement the grant we gave last year of $20,000 to increase the accommodation at this Fair. It would be a fatal mistake for Guelph if she delayed in taking advantage of that grant and failed to, at once, go to work in order to retain and maintain this great agricultural fair within its own borders.

I will take a retrospective view and tell you how it came that the Agricultural College was established in Guelph. In 1870, a long time to look back to, but a very short time in the history of a province, when the Hon. John Carling was Commissioner of Agriculture in the first local Government in the Province of Ontario, he purchased the Mimico Farm, where a model farm for the Province was to be instituted and educational interests built around that farm which he had selected. But in 1871, there came a change of Government and different views prevailed in the House and the whole question of a selection of a site was relegated to a special committee composed of the prominent farmers who were then members of the local Legislature. They sat and they failed to agree as to whether that site purchased by the Hon. John Carling should be utilized or not. When they disagreed the Government of the day called in the aid of two professors from the Michigan Agricultural College, Professors Miles and Kindley. They examined the different sites that were being offered to the Government throughout the Province, and they advised the Government of the day to select the present site on which the Agricultural College is now built and which belongs to the Province of Ontario. Their advice was taken, and the sum of $75,000 was paid for the 500 acres of land. It was then called Morkin Lodge and Mr. Stone who owned that farm had to be ejected by forcible means because he had relented of his bargain and wished to retain his old estate. That was the way in which the Agricultural College was established in Guelph, and the most prominent reason that was assigned why that site should be selected instead of Mimico was this: Mimico was supposed to be in such close proximity to the growing City of Toronto that it would detract from the studies that the students would have to undergo, and if that was a good argument then, it is still a good argument to-day, because this Fair coming to the Royal City of Guelph where the Agricultural College is situated—these associations are doing much good for the building up of the agricultural interests of the Province of Ontario. They are merely satellites revolving around the great educational institution of the Province of Ontario, and I say it would be—shall I use a strong word?—a disgrace to the City of Guelph, if the citizens have not the enterprise to go forward and make use of the Government grant, and see that the necessary accommodation is provided before the next annual meeting of this great Provincial Fair.

I am indebted to the courtesy of the Deputy Minister of Agriculture for some of the data that he so kindly gave me in connection with this matter. From him I learned that from 1873, when this College was established here, up to 1907, the Province of Ontario had expended on capital account no less a sum than $759,000 in building up our great agricultural and educational institution. One thousand students a year has been the average for several years of those who have gone there for their agricultural education; out of that, 797 of them have obtained diplomas, 268 of that number have taken the four years' course and are now entitled to be known as Bachelors of the Science of Agriculture conferred by the University of Toronto.

Ladies, I know that you will agree with me, that so long as they confine their bachelorhood to the Science of Agriculture well and good, but upon bachelors who desire to remain in single blessedness, it is a consideration in the minds of many of the Legislature whether the time has now arrived to impose an additional tax, in order to keep up the revenue of the Province by way of supplementary revenue. You have heard from the Minister of Agriculture and you will pardon me if I do not indulge in throwing boquets to him because he has already received them from his confreres in the House, and whilst there are many good men in the Legislature, I take this opportunity of publicly saying that upon no one could the honor have fallen more popularly than upon the appointment to the exalted position which he occupies to-night in the Province of Ontario.

He has told us about the sixteen millions of acres of land in the clay belt up yonder in New Ontario. I have also paid a visit to that district. Every word he said in connection therewith is absolutely correct.

There is another condition of affairs in the Province of Ontario to which I propose for a few moments to direct your attention. This Province of Ontario is 1,100 miles in length. It is 700 miles in breadth. It contains 126,000,000 acres of land. How much of these many millions of acres have the people bought from the Crown? Simply 24,000,000 of acres; 80,000,000 acres of land have not yet been surveyed, and to-day no less than 102,000,000 acres is still held in the name of the Crown. That is the condition existing to-day in the Province of Ontario; therefore we have only been playing with the very fringe of this great province. Comparatively, we know nothing of the vast resources that are in store for the future generations who will take our place in due time to conduct the affairs of this great province. I remember about a year ago reading a statement made by Professor Zavitz, that notwithstanding all that 3,000,000 acres of the cleared land is allowed to go to grass, 3,500,000 in addition thereto is held as pasture land, and we are decreasing the acreage annually which is being turned up by the plow at the rate of 100,000 acres per annum. Surely there must be some reason for this problem that has arisen in the agricultural life of the province. I believe its solution will be met through the medium of that educational institution we have located in this vicinity.

After all, the agriculturists of the Province of Ontario are in a very prosperous condition, that is if the statistics of the bureau of industries can be relied upon; because I find that during the past ten years the farmers, including their land, buildings, their implements and live stock are worth today, collectively, two hundred and seventy-four millions of dollars more than they were ten years ago. That is a great increase in ten years in the value of the agricultural industry of this province, and in addition to that you have enjoyed prosperity; because at last a home market has really come into existence. I do not purpose to-night to traverse for one moment any political issue. I am not going to indulge in tariffs, because the two great political parties in the Dominion of Canada are practically committed to the principle of protection, and side by side with the growth of agriculture we have our manufacturing industries, and the day is past when any jealousy should be allowed to exist between the agriculturist and the manufacturer of this great province.

The manufacturing interests have no less than eight hundred and sixty-four million dollars invested in the manufacturing life of the Province. They give employment to nearly four hundred thousand artisans. They spend one hundred and sixty-five million dollars in salaries and wages, and to a considerable extent that has been one of the factors that has created the home market. It has increased the cost of living by twenty-five per cent. in the Province of Ontario, and, for all I know, throughout the length and breadth of the Dominion, and consequently, the farmer, to that extent, has received a higher price for the produce of the farm, and I hope and trust this national view of the question will receive the consideration to which it is entitled.

There is another issue growing rapidly which we call the "Industrial Problem." There is an old adage, and a true one, that "when a man ceases to dream the gods die." That is just as true to-day as it ever was. Put in other language, when men cease to occupy their mental thoughts and casting à glorious horoscope over the vision of this great country, then the spirit of decadence will have settled into the national life of the Dominion of Canada. We have to-day social conditions arising in this country, because they cannot exist long in the mother land before they find their way over to this country. You see in the mother land, the condition of affairs to-day which we call the socialistic idea, and that movement has received a large amount of sympathy from the Christian Church and is finding its way into this country, and there are a variety of reasons and a variety of remedies offered to the public in order that the people may resume the national control of their franchises through some great economic law that has not yet, mark you, been annunciated.

I remember reading, a few years ago, an excellent essay, by a member of the Toronto Press Association. I think his name was Mr. Cross. He says in order to meet the condition of affairs and to find a solution of the industrial problem, it will be necessary to recast the politics of the country, and that it will also be necessary to find some harmony between socialism and individualism, and if the people are going to assume the national control of their industries, it must be entirely by a principle that will commend itself to the highest degree of human liberty. These were some of the views that were outlined, and they are well worth thinking about.

The agricultural industry is said to be liable to attack from another quarter, owing to the rapidity with which science grows, and one able scientific man has said that this industrial problem is not going to be solved by legislation, but in the laboratory. It is not going to be solved by politicians, but by chemists, for he says the chemists are already in possession of this fact; that all the elements of food which go to sustain human life are existing potentially in the atmosphere, and that the chemist will extract them from the atmosphere far easier than you gentlemen can extract them from the earth, or the plant, or the soil, and then Paradise will be regained. No more work, but a continual feast of good things and intellectual repose. We shall all be able to solve the riddle of existence and I know you would like to be living in such days.

ADDRESS.

By G. C. Creelman, B.S.A., M.S., President Ontario Agricultural College, Guelph.

It gives me the greatest possible pleasure to be present with such a large audience of people from country places. It has given me pleasure to sit and listen to the eloquent addresses that we have had to-night.

I feel very much indebted to those who, in arranging this part of the program, included me in the list. It has been my privilege during the last five years as head of the Agricultural College to go from place to place, from school section to school section of this splendid province of ours, and I would have been dull and my eyes would have been closed had I not seen many things that might be improved, and I am going to take this opportunity of saying one or two things that might be of benefit in improving the education of our boys and girls in country schools.

The boys of this country, living upon farms, when they get to maturity and take their places side by side with their fathers on that farm, are not any better prepared for their life's work than the hired man who works alongside of him and that is a deplorable thing; and the young girls in the farm homes educated in the ordinary country school at the present time, when they grow up to young womanhood, are not in as good a position to take their places as wives and mothers as were their own mothers. They are not as well prepared in domestic duties as their mothers were. After all these years of so-called progress and prosperity in this country of ours, I am sorry to have to say this is true in most of the agricultural communities of the Province of Ontario.

I am going to qualify my remarks or I would leave a very bad taste in your mouths. But what I am prepared to prove is this, that while our public schools and high schools and universities have been most excellently administered, yet the children in the agricultural homes of this country are not as well prepared to battle against life as were the boys and girls who worked side by side with father and mother and were educated by the brainy men who came out from the Old Land and taught in those early days. It is not long since I attended a country school myself and I know when I came to the Agricultural College I could not have named twenty trees to save my life, and I was brought up in the bush, and I have tried the experiment with a good many country boys that come to the College and there is not one in a dozen can do it, and there is not twenty men in this audience who can do it. If you think you can, take out your pencils and start, and after you get past oak and elm and maple and ash you have to stop and think. When I tell you there twelve varieties of maples alone in Canada, you can easily understand that when public schools are taught by sixteen year old girls, they are not in a position to give boys of the farm the proper education to fit them for their life's work. There were things I did learn in that country school that were drummed into me day after day, that I have not forgotten and never will forget, and which I think will never be any use to me in God's world. I can start up in the north-east corner of Europe and name the rivers: Petchora, Dewina, Orega, Neva, Vistula, Oder, Elbe, Rhine, Seine, Loire, Goronne, Douro, Gaudiana, Gaudilquiver, Ebro, Rhone, Po, Tiber, Danube, Dniester, Dnieper, Don, Tagus, Volga, Ural. I was taught that a relative pronoun, or more properly a conjunctive pronoun, was one which in addition to being a substitute for the person or thing, connects the clause with the antecedent which it is intended to qualify or modify. I know the mountains of Asia and I wish I did not. I know the capes of North America; I know all the tributaries of all the great rivers in the world. I can say them just as well as I can my A B C's. Every teacher coming in fresh made a new start and we had to go over them again and we did not give it away for fear we would get something harder and we went over the same thing over and over again. I ask you trustees to give this your serious thought and consideration and see if something cannot be done to give your boys, when their time is not worth very much, an opportunity to learn things he loves to learn, things that a boy will stay after four o'clock to learn. At our Consolidated School they come back in the holidays to look after their school garden.

I have a son attending the Macdonald Consolidated School and he came to me one day last fall just after the Guelph exhibition and he said, "Father, I won five dollars yesterday," and I said, "You did? How did you do that?" He said, "It was the easiest thing you ever saw in all your life. There were forty-two of us entered into a competition and I was fortunate enough to win." I asked him what he had to do and he said, "Not very much, there was a barrel of apples of all kinds and they turned it out on the grass and all we had to do was to name the different kinds of apples and tell whether they were summer or fall apples." I asked him had he anything else to do. "Yes, they had a collection of common insects, those little six-footed animals that prey upon our fruit trees and cabbage patches and bean fields and the oats and rye." I asked him what he had to do with them and he said, "Pick them out and name them and tell whether they were injurious." And I said "Were you able to do that?" And he said "Yes, they were just the ordinary insects that are around here." And I said, "Had you anything else to do?" And he said "Yes, we had to name the different kinds of birds and tell whether they were injurious on the farm or whether they were beneficial." And I said, "Could you do that?" He said, "Yes, sometimes we get up at five in the morning to listen to the birds and learn their different calls, so that we can recognize a bird and know whether that was a bird to go after or leave alone." And I said, "You have an education now, that whether you become a lawyer or a doctor or any other kind of a good citizen, you will have a good start in life that will give you an interest in life's work for all the rest of your days if you never go any further, and you are only thirteen years of age." And I say it would pay you farmers whether you are bachelors or not, whether you own land in the place where you reside or in the next school section as well, it would pay you to say to the people, "I am willing to put up 10, 15 or 25 per cent. more taxes for this school section in order to get a man who can teach my boy or my neighbor's boy just that sort of thing, so that when he becomes a man he will be able to do something besides hoe the weeds and draw the water.

There is not a woman in this Province, in city or country place, but has to do three times a day, their cooking or sewing or laundry work in some capacity and not five per cent. of the people in this Province keep servants. 95 or 96 per cent. do their own work with the assistance of their daughters or sisters or mothers, and yet we have no system in the Ontario public schools in the country places, whereby that girl learns one thing of any one of those three things she has got to do every week all the rest of her life. There is no reason why, with an equipment that would not cost $50, every little girl who is a little mother in herself and who has home making instincts in her from the time she takes up her doll, should not be taught the cooking of simple dishes and the simple washing of clothes.

I think we should have this means of education for our boys and girls. We are just at the beginning of agricultural science, and while Ontario is held up before the world as a leader in agriculture, and while the Ontario Agricultural College has within its doors, boys from twenty-two different countries in the world, representing every province in the Dominion and every continent in the world, yet we are just on the edge of things, and if the children of this country get the kind of instruction I am telling you about, we will be in a position to keep up with the farmers in other countries.

One movement is taking place at the present time of which I wish to give you a hint, and that is, instead of depending on the Agricultural College which is only one institution, and can only accommodate one per cent. of the eligible farmers' boys between the ages of 16 and 22 and the other 99 per cent. must go without the kind of instruction we are able to give them. In order to reach the other 99 per cent. we are trying an experiment now of placing our graduates in some of the counties to instruct the farmers. You say, "What can that boy do for us on the farm?" True, he cannot do very much at first, but he will do much as days go by.

If you have a new weed on your farm, you say "I will pick that and send a sample to the Agricultural College, but you have not the envelope and paper handy and you forget to do it and the next day your wife sweeps it out. But where you have one of these young men in your county town, you can take it right in to him and he can tell you all about it. How many times have you seen an insect you never saw before and you do not know whether this is going to do harm or good. This young man will be able to help you greatly in this respect and in many other ways that I could not take time to enumerate.

It is only because these things are close to my heart that I speak to you in this way, and I trust that the farmers of Ontario, ten or fifteen years from now, will be just as much ahead of other countries in agriculture as they are in the year 1908.

LECTURES ON PRACTICAL SUBJECTS, DELIVERED IN THE LECTURE ROOM IN THE WINTER FAIR BUILDING, GUELPH.

FATTENING CHICKENS AND DEMONSTRATION IN TRUSSING.

By Miss Mary Yates, McDonald Institute, Guelph.

Perhaps that which I have to say may not apply to the birds that are being shown here, but what I have seen in other parts of the Province does not compare favourably with table poultry in the old land. We have been very delighted in England with the beautiful eggs you have sent over, but I am sorry to say we have not been so satisfied with your poultry, and my topic to-night is more especially the fattening of chickens for market.

It may be that your temperamental and climatic conditions are somewhat different to ours in Europe. I think Canadians on the whole seem to be a little thinner than John Bull, and as a people you may be said to resemble the active laying races of poultry rather than those plump soft varieties that are the best for fattening purposes. It may be that you do not take so kindly to feeding here as we do in the Old Country, and it may be that our birds resemble us. Many people over here seem to be troubled with indigestion and nerve troubles, and if the poultry follows your example you will never be able to turn out the best plump, tender, fat chickens as juicy tempting morsels for the epicure.

There may be other difficulties present in this country of which I am unaware. Good feeders seem almost to be born and not to be made, and those who are interested in the feeding of beef cattle will support me in this.

Some women appear incapable of knowing when their husbands even are enjoying their food, and such women should never undertake to feed poultry with any degree of success. The man or woman who does not study the little details, and give careful consideration to the satisfaction of the birds, will never be able to produce the best results.

It is essential to have the right breed to begin with. There are four main groups into which all races of poultry may be divided. First come the laying or non-sitting varieties, and it is practically hopeless to feed these for table use. The well-known table races, as we understand them in Europe come next, and are totally different in conformation and character. Thirdly, the General Purpose fowls form an important group to themselves and may be said to do moderately well in both these respects, but only moderately well, they supply what may be called a third-rate market and could never be made to do duty for a first-class customer. Then lastly there are the ornamental races which should never be seen on the farms at all. For a few minutes let me draw your attention to the names of some of these varieties.

ECONOMICAL CLASSIFICATION OF THE RACES OF POULTRY.

1. Laying or non-sitting varieties	
Hamburg	Dutch
Red Cap	
Campine	
Brackel	Mediterranean
Minorca	
Black Spanish	
Andalusian	
Leghorn	
Ancona	
Scotch Gray	

2. Table Breeds	
Dorking	
Indian Game	
Old English Game	
Modern Game	
La Bresse	First class French races
La Fleche	
Creve Coeur	
Dumans	
Courte Pattes	
Flaverolles—Second class, French	
Coucou de malines—Belgian	
Orloff—Russian	

The Dorkings we almost regard as an ideal type. Shape and confirmation is very important. There ought to be quantities of well-flavored tender flesh on the breast, not on the thigh and the legs, where we find it in such birds as the Rock and other general purpose races. The French, as you know, may be said to produce the best table poultry in the world, but I do not for a moment suggest that you should try to use here the delicate varieties that are valuable in Southern Europe. I merely want to point your attention to the fact that no poultry is ever seen here that can even begin to compare with the table delicacies that are produced from these races, and it is well to bear this in mind when desiring high prices for export trade. I can assure you that it is not an uncommon thing for the French poultry keeper and for the French farmer's wife to realize $5 each for the birds produced from these races, especially fed and fattened as they are for the tables of the Princess. Probably they could not be brought to first-class maturity here, but it will show you the sort of thing the exporters are up against as compared to our poultry markets here. The high-class market of the Old World is patronized by royalty and nobility, together with the critical merchant princes, and these people are willing to give very high prices for the best. It is no use thinking that the sweepings from the fanciers hands, or the culls from the laying stock, can be marketed as high-class table birds. This trade simply cannot be captured without specialization.

The Flaverolle, which is used in France to supply the second-class market, has all the hardiness of the Rhode Island Red with the breast of the English Dorking, and it is the variety to be recommended for better class market here. I can get Flaverolles ready for the market in a shorter time and at cheaper cost than any other variety I have ever tried, and can recommend them to those of you who may think of attempting to produce excellent table fowl for the best customers. For wholesale work, if several poultry keepers in a neighborhood would take up the same variety, and market them together, it would attract a better class of buyers who can only place orders where there are large supplies to be obtained. From the little experience I have had of your markets in this country, I know there is a great and growing demand springing up in the cities and towns of this Province for a better class of poultry, and something ought to be done to supply it without running the risk of importation from other countries.

I have been asked to speak to-night especially on fattening poultry, therefore I take it that I may leave out of the question anything that pertains to the raising of the chickens. Feed generously from the first however, and give less exercise. If you are specializing spend all your energies from the beginning upon gaining the object in view. We have received as much as $1 apiece for broilers that were sold in Toronto the first week in May. You will remember that this is the time at which the Horse Show is held, the races are approaching. The thinking men and women of the community should be able to put two and two together and realize that in connection with large social gatherings of that nature, numbers of entertainments are given by people who want the best to be had, and therefore it is a business-like time to have your poultry delicacies ready to put upon the market. The banquets and parties that are being given at that time require large supplies of broilers. The weight of the birds should be from 2½ to 3½ lbs. a pair, and that 3½ pounds must not be made up of skin and bone; it must contain a quantity of delicate breast meat. For the spring trade fattening in any serious way is unnecessary, but when it comes to later work, the birds to be finished as economically as possible should be crate fed, and properly fattened. Personally I have always found the best results from the adoption of the French method;—that is, the use of sour skim milk and meal. Sour milk is necessary to keep the birds in health if no vegetables are to be used, and there is considerable difficulty in keeping up the supply of these of a sufficiently succulent nature. Mix the meal and the milk together in the proportion of a quart of meal to one quart of sour milk and let the mixture stand twenty-four hours to cream, as it is called. The feeders should know the proper consistency—what the birds like best and what they relish most. The meal that gives the very best results in the Old Country is ground oats, hulls and kernels ground finely together, but it cannot be obtained here. A fair substitute may be made from a mixture of corn meal, two parts to one part of shorts, and one part of low grade flour. It is well to add fat to the milk. It is to be supposed that skimmed or separated milk will be used, therefore when possible add ¾ of a pound of fat to a gallon of milk, raising it gradually to a pound as the fattening period advances. If feeding for show it is well to make an effort to obtain some succulent vegetables as well.

Q.—Do you advocate not using vegetables?

A.—You do not need the vegetables if you have sour milk. To use lettuce is admirable, but cabbage will give good results.

Q.—Is butter milk as good as skimmed milk?

A.—In Ireland they use butter milk a great deal. I have not handled it myself, but I have seen extremely good results from it in many places.

Q.—Do you use any salt?

A.—No, never use any salt.

Q.—Should the milk be thick?

A.—Yes; certainly. In France they are in the habit of buying the milk in large quantities at the time of year when it may be bought cheaply, and then it is stored in pits in the ground and is dug out as required.

Q.—What do you use to replace the butter fat?

A.—Any kind of fat that is available, mutton fat has given me the best results.

Q.—How is tallow?

A.—Mutton tallow has given me extremely good results.

Q.—How do you use the fat?

A.—Either render it (that is melt it in the milk) or put it through a cutting machine; but this is only advised for those going into the work in a large way. If it is mixed in large lumps the greedier birds will get it all. The food however is of comparatively little importance in comparison with the conditions under which the food is given, and that is the essential point I want to drive home. They must be quiet. A sleepy condition must be induced in the birds. Strangers must be kept away from them. Dogs excite them. The fattening stock must be kept apart. Try as far as possible to have them disturbed only twice in the day to feed. See that all the attention is given to them at those times only. Two good feeds will give you far better results than three feeds each day. Let all the cleaning be done at those hours, and any birds taken out then that are ready for killing. it has been my practice never to allow visitors to go around the fattening sheds at all. Nothing is more tiresome than the curiosity, laughing, and chattering of visitors going around and the barking of dogs, or children raising a disturbance. It means, too, the losing of a day or two's feed. Keep their appetites as keen as you can, and this is where intelligent feeding is shown. Even a teaspoonful of feed too much during the latter stages will ruin the chances of a high class bird. I have never seen any poultry shown in this country that could begin to be mentioned in the same day with the poultry to be seen exhibited at the Dairy Show in the Agricultural Hall, London, England in the fall, or at the Fat Stock Show at Smithfield just before Christmas. It has been one of my greatest pleasures to take prizes at these shows and at some of the other leading table poultry shows in the country.

Now comes the question of length of time to feed. Two or three weeks will give a sufficiently good bird for private customers, but when it comes to the showing you must exercise your ingenuity to keep them going for two or three months, and even one teaspoonful too much will spoil all your chances, and the bird will have to be turned out of the crates and allowed to recover on grass. It has been said that women cannot undertake these matters. Let me tell you that in France one of the biggest fattening establishments (where they keep on hand 4,000 birds in cages) is managed entirely by women; and where women will study the feeding of their husbands and families they haven't any difficulty in feeding chickens. Where they like their family to be well fed and enjoy their food, they will be able to turn out high class birds. The last prize I won before leaving England was at the Royal Hants Agricultural Societies' Show, first prize for the best pair of cockerels. I won with Flaverolles, and I beat a man who, I think, will never forgive me, and he made the statement that "women should keep out of such work." I mention this just to encourage those who are thinking of taking up table poultry on their own farms. There is no difficulty whatever about it. In England we use the craming machine very largely, and we feed ten days from the trough, and then we cram ten days. Where you are not using a cramming machine it is well to feed very sparingly at first, just as much as the birds will eat greedily, and then follow later on with as much as they will take. One of the secrets of success is to fast the birds twenty-four hours at least before they are put on this feed. Start them off on the keenest appetite and then all will go well; start them off in a half hearted way and you will have lost your chances from the beginning. If the birds to be finished off have been collected from some distance it is advisable to give them a week's feeding in the open before they are caged, as the shock of the journey upsets them. After that feed sparingly for a week.

Highly fed birds should be killed and trussed where they are fed. They should never be marketed alive.

Your attention should be drawn to a difficulty that shippers are having with Canadian poultry just now. Birds should never be shipped with their crops full of food. High class prices cannot be obtained if you market birds with a crop full of undigested food. The flesh of such birds is unlikely to be wholesome. I am told that there is a law forbidding this, and yet one sees birds exposed for sale continually in an absolutely disgraceful condition with their alimentary tracts full of decomposing material. I have even been given birds for demonstration purposes by local poultrymen that have not been fit for human food. Toxins are produced by the partially digested materials which effects the condition of the flesh and renders it undesirable for human beings to eat. A bird should be fasted for from 36 to 40 hours before being killed in summer time, and at least 24 hours should always be allowed in winter. It is highly advisable that birds should be dry picked and packed in a cool place. Complaints are made by poultrymen who state they cannot ship poultry because the cars are not in proper condition. The trouble really begins when the birds are not fasted before killing and then are packed in a warm place.

Q.—How do you kill and pick fowl?

A.—We kill by breaking the neck.

Q.—Don't you bleed them?

A.—They are bled, but not as you generally understand the term. I will take one of these birds and show you exactly how I do it myself.

Q.—The general complaint is that the fowls are hard to pick without scalding them?

A.—They may be a little harder, but if you kill and pluck right away there is no difficulty. I understand that some of these birds have been killed by bleeding at the roof of the mouth. That is considered a very admirable method in France, but I am not satisfied that it is the most humane way, unless the construction of the brain is understood. A week or two ago in Aylmer I made that statement, and a doctor happened to be present in the room, who said that an ordinary individual could not cause instantaneous death by this method, because the knife should penetrate a certain part of the brain. I have never been fully satisfied that the bird is absolutely killed at once in this way by the ordinary poultry man. The knife they use in France is made for the purpose. It is curved. A part of the brain that must be reached is situated where it is not possible to reach it with a straight knife. The method of killing I have adopted is by breaking the neck by a sharp downward and backward jerk. If you stand firm on the left foot with the right foot slightly advanced and draw against your knee you will do away with the common mistake of a twitch, which will break the head right off. You make the break in the neck just behind the head leaving a space that enables all the blood of the bird to run down and form a clot there.

Miss Yates then dressed and trussed a bird in a very rapid and perfect manner, for which she was loudly applauded by the audience.

WHEN AND HOW TO HATCH.

By L. H. Baldwin, Toronto.

As chairman I will make my remarks short and allow more time for the other speakers. My subject is "When and How to Hatch." I think it is a very important question and one that lies at the bottom of much disappointment; especially with farmers, in the financial returns they expect to get and do not get from their poultry. You all know that in sowing your seed crop it is important to know when and how to sow. If you delay your seeding or have not the seed bed in proper condition you have a crop that is difficult to keep free of weeds. On the other hand if you are careful to make a good seed bed and sow your seed in good time so that it will receive the refreshing spring rains and get good vigorous growth the result is that you will have a crop that gives you a good handsome profit. I am perfectly certain that this is also true with regard to poultry. How many farmers attempt to hatch their poultry at the proper time? They put it off until they are through with their other work and do not try to get their hatching done before the heavy work of the spring commences. A good many farmers say they cannot get hens broody early enough to hatch their chicks. That is true to a large extent just because the previous year they were late in setting their eggs. If you will make an effort in one year to get a broody hen from your neighbor if you haven't one yourself, and if your chickens hatch early so that they will commence laying early in November or October, they will naturally become broody earlier in the spring, and you will have them on hand to hatch your eggs early the following year. That is the chief point to make to the audience to-night. How you should hatch depends a good deal on your surroundings. I would like to have taken a little time to have illustrated this but I will not do so to-night.

Q.—Would not an incubator get over that?

A.—I was going to say there are two methods,—the natural method and the artificial. I think the farmers might make use of incubators to a larger extent than they do. I am quite free to admit that we have had great difficulty in artificial incubation, but still I see no reason why farmers should not use them more than they do. The one point I want to make is to urge the farmer to see that the chickens are hatched earlier than ordinarily is the case, and to bring that point home to you is all I will attempt to do to-night.

THE PASTEURIZING OF WHEY.

BY FRANK HERNS, CHIEF DAIRY INSTRUCTOR FOR WESTERN ONTARIO, LONDON.

The question of heating or pasteurizing whey returned from cheese factories has been given some attention in an irregular way for many years. It was tried more or less successfully by a few factory managers at different times. There is no claim made by those who have lately taken up the matter that the idea is new or that they have made any new discovery. Bacteriologists advised this system of dealing with whey long ago, particularly where bitter flavors developed in the curds. What is claimed, however, is that two years close attention and experiment with 58 cheese factories has warranted the assertion, and goes far to prove that proper and systematic pasteurization of whey before it is returned to the patron is a step towards securing a better milk supply at our cheese factories, and a means when properly done of increasing the feeding value of the whey and doing away to some extent at least with the evils of unclean, ill-smelling whey tanks, and bitter and yeasty flavors. It is no doubt true that it would be far better for the cheese industry if no whey was returned in the cans, and this system has been repeatedly advocated by dairy authorities and others who know the evils of returning whey in cans; but unfortunately patrons do not always follow good advice. We find therefore that practical conditions bring us face to face with the fact that in Western Ontario at least the majority of factories return the whey, and so far there has not been offered any more practical method of returning this whey than in the same cans in which the milk is delivered. For many years this whey and whey tank question has been one of the problems difficult to deal with. Admitted by nearly every one in the trade that returning whey in cans from the ordinary whey tanks and under conditions that has prevailed for twenty years or longer was a distinct means of injuring the flavor and quality of the cheese, yet no real practical solution of the difficulty has been offered other than appeals to the maker and patrons for more sanitary conditions which have had a marked effect. During the past four or five years a great improvement has been brought about through dairy instruction and public opinion in the conditions of the whey tanks, yet we are still a long way from perfection, and many tanks are still sadly neglected and kept in bad condition, in fact there are still a few tanks that are not cleaned during the season, in defence of which neglect the very doubtful argument is put forth that the more filthy the whey tanks become the more likely are the patrons to pay particular attention to cleaning the cans. I think factory managers sometimes underestimate the influence of clean whey tanks on the attitude patrons take in caring for milk.

We have been looking forward to the time and I hope and trust it will come when human nature will be changed to such an extent, and such up-to-date methods followed, that no careless cheese maker or patron will be known. Then will the evils of bacteria-laden whey, unclean whey tanks and improperly cared for milk disappear and then no doubt pasteurization of factory by-products will be unnecessary; but in the meantime what? Depend on the slow process of education and perhaps compulsion to remedy the evil of unclean whey tanks, when for a small cost to each patron a partial remedy at least may be provided and conditions improved so far as the whey is concerned right now, not ten years from now. In dealing with this matter I went straight to the men who produce the milk and the women on the farm who usually have to wash the cans, who to my mind are in the best position to know the exact condition in which the whey has been coming home from the factories for many years past. I sent out 1,500 letters to patrons of 23 factories where the whey was being pasteurized for the first time, dealing with the claimed improvements of the whey, asking some twenty questions relative to these improvements, and out of the several hundred answers received the opinion was almost unanimous that pasteurization of the whey was a distinct improvement, and they expressed their willingness to pay their share of the cost to continue this system at their respective factories. I do not think the opinion of these patrons should be ignored, and I believe they know what they are talking about. The makers say the milk comes in better condition and some of the cheese buyers claim the quality of the cheese improved in flavor.

A Few Reasons for Pasteurizing the Whey.

Let us look at a few reasons for continuing and extending this system. The fact is well known that the germs which produce certain flavors develop very readily in ordinary sour whey, and that these germs are readily conveyed through the medium of the whey in the patrons' cans. These germs find a breeding ground in the crevices of the can and are very difficult to dislodge; they rapidly develop in the milk when brought in contact, and produce yeasty, bitter and other putrefactive flavors. It is not practical to pasteurize the milk for cheese making, consequently to prevent as much as possible the contamination of the cans we resort to pasteurization of the whey. A whey tank may be cleaned every day, but unless the tank is sterilized with live steam it is not clean from a bacteriological stand-point. The wood being porous allows the sour whey to penetrate and with it many injurious bacteria. Steel whey tanks are very much to be preferred on this account. Whey unpasteurized from ordinary whey tanks goes into the cans with an acidity of from one to 1.7 per cent., depending on the cleanliness of the tank. The average acidity is about 1.15 per cent. This means very sour whey, the sugar of which is nearly all changed to lactic acid, which readily affects the tin of the can. I have failed to meet the patron who would rather feed or have in his can old sour ill-smelling whey in preference to sweet whey. The average acidity of the whey going into the patron's can where properly pasteurized was .4 per cent. about three times as sweet as when not pasteurized. Some factories were able to return the whey with an acidity not greater than .25 per cent.

There is a small mechanical loss of fat in the whey in the process of cheesemaking, even under the best conditions;—less when the milk is in good condition, more when not. By all means let us endeavor to have the milk sent in such good condition that this loss will be the least possible. The average loss in the whey for the factories of Western Ontario this year was .23 per cent. Now, I am not prepared to say what this fat is worth for feeding purposes, but if it is worth anything let us see how much of the fat the patron really gets under ordinary conditions. The average per cent. of fat in the whey going into the patrons cans where not pasteurized this year was .09 per cent. or, less than one-tenth per cent., in some cases as low as .03 per cent. Where does the remainder of it go? It floats on the top of the whey in the tanks and when the tanks are not cleaned regularly becomes a mass of decomposing floating material which is a nuisance to the cheesemaker; in fact, is given as an excuse by him after it has accumulated for not cleaning the tank. He says he does not know what to do with it, and it is certainly almost a total loss to the patron except when the whey gets short some morning, and his can gets a deluge of this stuff which I defy anyone to get out of the can and clean it properly with the ordinary facilities at hand at the average farm house. It seems somewhat inconsistent to ask patrons to improve in the methods of caring for milk, and then persist in putting into their cans this old, sour, foul-smelling, gravity skimmed whey, and leave them to believe that this system of handling whey is the best that can be devised until more up-to-date methods are adopted by them in the care of the milk. On the other hand we find that where a proper system of pasteurization has been introduced the average per cent. of fat in the whey as it is returned is .22 per cent. or practically the same as when it came off the curd. This fat is evenly distributed through the whey, is liquid, is easily passed from the can with the whey, and does not interfere with easy and proper washing. If this fat is worth anything for feeding you will notice there is two and one-half times as much fat returned in pasteurized whey compared with unpasteurized, in the latter the fat is left in the whey tanks, in the majority of cases. When whey flavors develop in some of our cheese, does it not look reasonable to suppose that such flavors may be induced by returning unclean whey in the cans, in fact this is one of the strong arguments put forth for many years by those who are opposed to returning whey, that such a system gave the cheese a whey flavor. We may rest assured that human nature will always creep in, and some patrons will fail occasionally to entirely get rid of injurious bacteria from the cans. It is therefore reasonable to suggest that all patrons be put on the same footing, so far as the whey question is concerned, and send them home sweet, germ-free whey *so far as possible*, and then look after the careless ones and see that they take proper care of the milk and cans. The question of tuberculosis might also be mentioned in this connection, since it is claimed that it is quite possible for bovine tuberculosis to be carried through the medium of the whey, and infection of the hogs or other animals to which it may be fed take place. If this be true, then it become another strong reason for proper pasteurization of all by-products from the cheese factory and creamery.

ADVANTAGES.

Whey properly pasteurized should go into the patron's cans from the whey tank, provided the tanks are kept clean, with an average acidity of not more than .3 per cent., and an average fat of about .2 per cent., while unpasteurized whey will have an acidity of from .9 to 1.7 per cent., average about 1.15 per cent., and a fat as low as .03, average about .09 per cent. The sugar is not converted into lactic acid and the fat must be worth more for feeding in the pasteurized whey.

The chances of contaminating the cans are much less, and when certain bacteria which appear to grow rapidly in sour whey are present, the proper heating of the whey will check their growth and prevent their spread in the patron's cans.

Yeasty or bitter flavor may be developed in the milk of one or more patrons from unsanitary conditions at the farm, but heating the whey will prevent the infection of other patrons cans, and the bacteria from being seeded at each farm. Consequently the patron who is guilty of sending yeast infected milk may easily be detected by the curd test and dealt with accordingly. The cans are very much easier to wash where the whey is pasteurized. It is absolutely necessary that the cans be sterilized or scalded with boiling water whether the whey is pasteurized or not. This should leave the cans sweet and clean without that disagreeable old sour whey flavor so hard to remove from cans which contain whey from tanks where it is not heated, or kept clean. Prevents to some extent at least the tin from being taken off the can, since less acid is present therefore the cans should last longer, the saving in cans alone should be considerable. Lessens the chances of over ripe milk during hot weather.

Pasteurization keeps the whey tanks at the factory in a condition that they can be readily and easily kept clean, no fat floating on top of the whey, and leaves no excuse for not keeping them clean. The temperature of 155 degrees to which the whey is heated must have in the time before it cools an influence in freeing the tanks and the whey from bacterial life.

PRECAUTIONS.

Pasteurization should begin as soon as possible after the whey reaches the tank to prevent the development of acid and to take advantage of the temperature of 98 degrees before it begins to cool. Care must be taken that the temperature does not rise above 160 degrees. A higher temperature will precipitate the albumen and cause the whey to be flocculent and slimy. A temperature less than 150 degrees is too low, as the growth of bacteria is not prevented to a sufficient extent.

Small or large quantities of whey should not be left over in the tank from day to day, as this whey will eventually become sour and act as a culture in the new whey, rapidily raising the acidity and nullifying to a great extent the work of pasteurization.

The boiler must be large enough to furnish economically the steam required. Inexpensive results cannot be obtained otherwise. The tanks should be as close to the boiler as possible and the pipes insulated to prevent condensation and waste of steam before it reaches the whey.

If live steam is used, pressure as high as practical should be carried, and the steam not given too much vent into the tanks or the boiler will rapidly be emptied of water. Heat under steam pressure by keeping the live steam going gradually into the whey as fast as it is generated by the fuel. Beginning with good steam pressure less water will pass over into the whey.

It is not wise to attempt to pasteurize unless it can be done properly. It will be a waste of steam, and the results will be disappointing. Pasteurization of whey is for the purpose of getting an even distribution of the fat, and getting rid of the evils of unclean, sour whey, and not a panacea for the evils of improperly cared for milk.

COST.

The cost will be according to the condition under which the work has to be done, such as size of boiler, location of tanks, whether the exhaust steam from the engine can be utilized, the system followed and experience. It will range from 50 cents to $1 per ton of cheese. Several tests made this year with live steam direct from the boiler under good conditions allowing $4 per ton for coal, place the cost at 64 cents per ton of cheese. The patrons get practically all the benefits from pasteurization, therefore should pay each their share of the cost.

DIFFERENT SYSTEMS OF HEATING.

The whey has to be raised from a temperature of 98 degrees to 150 or 155 degrees or about 52 to 57 degrees.

1st. Turn the live steam from the boiler under 60 to 80 pounds pressure directly into the whey, distributing through a simple system of three-quarter inch pipes to get an even temperature, and most economical use of the steam, this is the most effective system, and does the work satisfactorily, but it is no doubt the most expensive.

2nd. Turn the exhaust steam from the engine into the tanks, and add sufficient live steam to raise the whey to the required temperature. This system is less expensive where practical, perhaps not quite so effective, as it may take longer to heat.

3rd. Turn the exhaust steam from the engine into the pipe leading from the pump or ejector to the upper tank. placing the connection several feet above the pump, turning a small pipe inside the large pump pipe a foot or so long in the direction which the whey is travelling. Add sufficient live steam to get the required temperature. This is still cheaper, but some little difficulty may be found in regulating the temperature at first.

4th. Raise the whey from the lower tank to the upper with an ejector, add sufficient live steam in the upper tank to finish the heating. The ejector, if large enough, will increase the temperature about 20 degrees while the whey is passing through.

5th. Heat the whey in the lower tank with the exhaust steam from the engine to a temperature of 135 degrees, then raise with an ejector to the upper tanks, when it will be found at about 155 degrees, the ejector having supplied the extra 20 degrees.

Any small quantities of whey left in the lower tank should also be heated at all times.

6th. Use a special heater, a devise consisting of a pipe two feet long six inches in diameter, capped at both ends. The cap drilled and threaded to allow pump and exhaust steam and overflow connections. Set heater upright. Connect exhaust steam at the bottom. Connect whey pipe at the top, also overflow pipe. Whey is heated before it passes out through overflow pipe. If exhaust steam is not sufficient, add some live steam. May have to be disconnected and cleaned occasionally. Cost about $6 to make. This special heater has been found very economical for pasteurizing skim milk, should work equally as well for whey.

THE FEEDING VALUE OF PASTEURIZED WHEY.

BY W. C. SHEARER, BRIGHT.

I think before I explain the farmer's side of it I will just explain how we manage it at the Bright cheese factory. We have been pasteurizing the whey for two years. Our boiler is situated near the cement whey tank; we have two pipes into the tank. I think it cost about $12.50 to connect the pipes in this way. As soon as the whey is run in, or during the time it is coming in, the exhaust steam is coming in to bring it up a few degrees. It comes from the vat at about 98 to 102 degrees, and we do not want to lose any of that heat. When the whey is all in the vat, the cheesemaker is done with the engine on the vat, and he lets in the live steam and hangs a thermometer in the whey, and when it comes to 150 or 155 degrees then he shuts off the steam, shuts up the door and keeps in the heat, and it lies there from three in the afternoon till the next morning, and then he sets the pump going and elevates it to the other tank, where it is distributed to the milk wagon.

We pay a man 50 cents every morning to keep the farmers from quarreling because they all want a lot of whey. He gets there at 7 o'clock and he is there to half-past ten every morning.

Q.—How do you put the whey into the cans?

A.—With a rubber hose about 3½ inches in diameter.

Q.—Do you measure your whey in the cans?

A.—He has no means of weighing it. It is partly guess work; but after two years of experience I do not think I get a bit of any man's whey, and I do not think he gets any of mine. It has been very satisfactory. You must wash out the tank every morning. The cheesemaker does it for us. There is always a green man who wants to learn the cheesemaking, and this is his job, and he gets in there with a couple of pails of water and scrubs out the tank.

A good many farmers buy their butter and do not churn, and they send in two days' milk on Monday morning. I may have two cans to send home, and if I forget to send two cans Tuesday morning there is always a can of whey left for some other man to take home. The farmer next the factory offered to scrub out the whey tank for two cans of whey per day. A number of farmers were fighting mad when their whey was to be returned, and fought against pasteurizing it. I knew one of these farmers who to-day would not sell his whey after two years' experience with it.

The milk drawer comes around to my place about half-past nine o'clock, and two cans are set off, and if we are working out in the fields with the horses we let it stay there until after dinner, and then we bring in the two cans and we back it into the hog pen and pour the whey into the barrels. I only require to scrub this barrel out once a month. There will be a little thin wafer, like tissue paper, of fat rise each day. I empty the barrels out every morning. It is hard to get at the feeding value of pasteurized whey, because I have not handled the sour whey, since our factory never returned it until we got it pasteurized; but I can give you the experience of a man who has had it home for six years, and this year he had it pasteurized. I said to him, "Mr. Thompson, what difference was there in the pasteurized whey and what you got home six years before?" He replied: "I could not give you the money value, but my hogs are doing a good deal better, and it is not the large hogs that are doing so much better, but the little ones. I can raise the little ones right off the sow by putting the proper proportion of middlings and flour in the whey." I know two farmers who are raising their calves on this pasteurized whey. The farmer does not like to keep home the valuable milk to feed calves. The result is to try various methods, such as porridge and hot water; and so we get a lot of deformed dairy cattle that will never make dairy cows. Therefore, I think it is an important point that you can raise little pigs and calves on it. One gentleman informed me that he gives his calves the whole whey with some whole oats and bran fed dry afterwards, and he takes the prizes with these calves; so you may be sure they are not poor ones. Another farmer I spoke to over the 'phone before coming away, told me he had been raising calves on this whey and he was well pleased; and I think if we would hold a few meetings and tell each other the benefit we have found by using the pasteurized whey we would be adopting a good plan.

We used to sell our whey to a few farmers, and they gave us a dollar a cow for it, now we are able to make from five to ten dollars per cow.

I think the by-products of the dairy should be looked after. We do not get too much for the time we spend in the dairy. Just think of a cow that gives 6,000 pounds of milk, and you let the whey from that cow go for $1 for six months. I think it would be a great deal better to have it pasteurized, and take it home and feed it. I feed 15 pounds of grain to 100 pounds of whey, and increase it to 25 and 35 and 40 pounds as the hogs grow larger. I have often gone as high as 50 pounds of grain to 100 pounds of whey in feeding hogs that were weighing nearly 200 pounds. It pays to have your hogs weighing 200 pounds when you can sell them on a good market. Hogs sell best during July and August. I always try to sell out as nearly as I can in August, and only keep as many as will drink up my whey after that. A year ago last summer I kept a strict account of my hogs. On the first day of May I weighed the hogs and valued them at what they were selling for then, and I valued my grain that I had in my granary, and I purchased some oil cake and a little middlings. I found that the oil cake was the best thing I could purchase to mix with the grain for hogs. After figuring it all up, I found that I had cleared $10 per cow on the whey, and I used to get only $1 per cow before it was pasteurized. This year I have only made $8 per cow, because I made one bad sale of hogs, and coarse grains were higher in price.

Mr. Glendenning: You credit the profit on your hogs to the whey, you do not give any profit to the grain?

A.—I figured the grain at market prices; I was satisfied to get the market price. I do not know how else you would get at it. I think if a man gets full market price, he is well off.

Q.—How do you feed this oil cake?

A.—It is better soaked. I would not begin to feed much oil cake until the hogs get used to it. I feed barley meal and a little middlings; about one-third of the middlings and about a quarter of that bulk of oil cake all mixed dry. When soaked in whey it makes a mixture like porridge. It is soaked every morning until night, and then again from night until morning.

Q.—If you were feeding skim milk to hogs, would you feed oil cake?

A.—Yes, I would, I think it is the cheapest feed we can buy if fed in conjunction with other grains.

Q.—What other grains do you feed with oil cake?

A.—Oats and barley and a little middlings mixed with it. This year I purchased $25 worth of middlings.

Q.—Do you feed about equal proportions?

A.—No. About ⅓ middlings and ¾ of oats and barley, or about ½ barley, ¼ oats, and ¼ middlings; and then when that is mixed add oil cake, a quarter of that again.

Q.—Do you soak the whole chop or only the oil cake?

A.—No, the whole thing is soaked. It makes a nice sticky mess. I keep six hogs in a pen and one of those candy pails is a good feed for them. I soak the mixture in the candy pail, and when I go to feed I stir it up with a stick, and it is not necessary to do any dipping.

Q.—If you were feeding peas and middlings with skim milk would you buy any oil cake?

A.—Yes, I think I would.

Q.—Flax seed would be cheaper?

A.—Yes, if you have it it would be better perhaps. I buy the oil cake for $30 per ton. I drive right to the mill.

Q.—Would you not have made a profit over the market price by using water in place of that whey?

A.—There might have been a little; but you can tell the difference in hogs if you feed water and not whey, and another thing to consider is the great quantity of manure you get. I mix it with the other manure.

Q.—Do you keep the hogs in all the time, or do you pasture them?

A.—I let them out once a day on the grass, and then into rape. They are let out a half a day at a time so they won't fight.

Q.—How much do you credit to the rape?

A.—I throw in the rape and the ashes; I put in a handful of ashes once a day into the feed and a little salt. We have found that there is not very much difference in feeding sour and sweet whey for fattening hogs; but for the young animals of all kinds it must be sweet, or practically so. For the growing animals the lactic acid seems to have a beneficial effect on the digesting of the feed; but for the young calves this sour skim milk or whey or buttermilk is disastrous. In the cheese factory sections, the farmers have much difficulty in raising good calves, and the farmer should realize the benefit of raising their own stock.

Q.—How much does it cost to raise pigs up to six weeks old or weaning time?

A.—I do not know from my own experience, but I have it from others, and they put it at $1 to $2 per animal. Do not wean your pigs at six weeks of age; I let them go to eight weeks, and the best I have had were ones that went ten weeks till they were ashamed of themselves.

Q.—Do you think hog feed is best dry or wet?

A.—I have always practiced soaking, and especially if oil cake is fed it is better soaked.

Mr. FRASER: I have always fed dry and have had better results.

Mr. GLENDENNING: In the summer time we feed chop, and in the winter time we put it on pulped roots in a dry state. I think a great many farmers make the mistake of giving the feed too sloppy.

Q.—Do you think it is possible to have it too wet with skim-milk?

Mr. GLENDENNING: I do not know anything about whey, we have lots of skimmed milk.

Q.—What temperature is the pasteurized whey when it reaches the farmers?

A.—It is quite hot the next day when it gets home.

Mr. HERNS: There are some factories where the whey is nearly always short, and the makers, in order to get away from having any difficulty, increase the whey by the use of some cold water. We have two or three factories where they always pasteurized the whey, and after pasteurizing they turn around and pump cold water into it, and the result was the whey went home nearly as cold as when it was not pasteurized. The whey should go home in the morning at a temperature of at least 120 degrees, and in some cases higher than that.

Q.—Would you leave it in the cans to cool after it is delivered?

A.—No, I would get it out of the cans as quickly as I could. Where the lid slips into the can you will generally find the tin is worn off, and that will cause the rust to start. I have been sending two cans all summer, and I believe they are as good as new. When we empty the cans into the barrel we take the cans up to the house and empty a pail of water into every can; then we put it on its side and give it a turn or two and pour that water out, and then turn it on its head on the grass. We use a brush costing 25c., and we give the can a thorough scouring inside and out. We take boiling water and scald them every day and so make the cans look nice and tidy. We have found out there is nothing better than quicksand for scouring the outside of the cans. We get a pail of quicksand, and every Wednesday and Saturday take a cloth and some of it and rub the whole of the can inside and out, and it will make the can look like a new one.

Q.—Do you commence feeding that combination of oats, barley, and middlings to pigs eight weeks old?

A.—No, I put in a larger proportion of middlings for two or three weeks, and gradually make it stronger. You should be careful when you make a change in feed, I hardly ever have any sick animals from that cause.

Q.—Do you feed any charcoal?

A.—Yes; for use in winter we mix together one bag of charcoal (pulverized to size of marbles), half a barrel of unbleached hardwood ashes, one pail of salt, and ten pounds of sulphur. Mix all well together and feed half a handful to each hog twice a week. During summer we mix a little salt in their feed each day, and give some ashes occasionally. This treatment keeps their digestive organs good and sweet.

CLEANLINESS IN THE MILK SUPPLY.

By W. F. Stephen, Secretary of the Montreal Milk Shippers' Association, Huntingdon, Que.

Doubtless many of you will remember that at the Winter Fair here last year Prof. Dean treated, very ably, a subject similar to this. In the outset of his address he referred to the "ideal" and the "real," and while we seldom attained to our "ideal," yet our aim should be to get very near to it. I consider it of foremost importance that we should have an "ideal" in every sphere of life, and in attaining to reach that goal we undoubtedly reach a higher plane than if we had no standard before us. Again, I believe every community should do all in its power to encourage those who are striving to reach an "ideal," because such ideals always serve to show those less energetic, less enthusiastic, what may be done by those who try. Therefore, every means for supplying the highest "ideal" in the line of producing a *high-grade* milk and cream should be appreciated by the dairyman, factoryman and milkman, and their continuation should be vigorously encouraged by all friends of our great dairy industry. But, alas, too frequently we find dairymen at issue with every measure brought forth to better the milk supply. I ask why is this? Is our milk supply, as regards quality, in keeping with the advanced times? I fear not.

Milk, that most palatable, wholesome, nutritious, perfect, yet inexpensive diet—it and its products now so largely consumed by all civilized nations—is it being produced under the most cleanly and sanitary methods? I fear not. Then, if not, why? Is it through ignorance of its composition, of its susceptibility to contamination, by those engaged in producing it? Is it because of carelessness on the part of the producers? Or, is it because the dairyman is not sufficiently remunerated for his labor? Possibly all three causes have a part to play in hindering the production of *clean, sanitary* milk.

Clean Milk. What does this mean? Is not all milk clean milk? It may have been, but does not always remain so. I take it, *clean milk,* is milk taken from healthy cows under the most *cleanly* conditions, to which nothing has been added nor from which anything has been taken away. Such milk contains a comparatively small number of bacteria, and if cared for and kept under most favorable conditions will always be clean milk. But, unfortunately, herein is where the trouble begins, as almost as soon as milk is drawn from the cow it becomes a subject of contamination.

I am quite convinced, that in the early days of the dairy industry, when the work of milking the cows and caring for the milk was all done by women, that a more cleanly product was the outcome than when this became largely the work of our men, who are not, as a rule, so ready to observe the essentials in cleanliness as our women. The result has been, that as time advanced, and fewer women assisted in our farm dairies, undoubtedly there went out to the cheesery and creamery a milk higher in bacterial content.

"Bacteria." We find this mysterious word so frequently associated with milk and its products that we gaze on it with alarm, but as we look at it we find nothing to alarm us further than it has opened up a new field for study, a field unknown to our forbears. To the much ridiculed "scientist" and his wonderful microscope, together with his laboratory work is this revelation due. Bacteria I will not discuss, for I am not a bacteriologist; but, we are informed by the highest authorities in that realm, that from the time the milk is drawn from the cow it is in danger of infection from some species of bacteria which are constantly present in dusty, impure air, in bad water, on unclean utensils, on the hands and clothing of the attendants and milkers, and practically everywhere. Even in pure air certain forms of bacteria that have the power of souring milk are present. Such being the case, it is up to the dairyman to minimize in every way possible the source of contamination.

Milk is the most common and most extensively used liquid food of civilized nations. It is consumed by the infant, the invalid, the adult and the aged. In the household economy it takes a prominent place, and can be used in the makeup of many wholesome and palatable dishes. Manufactured into butter or cheese, its consumption is immense, and ever on the increase. The demand for condensed milk increases as its merits become known, by steamships destined for long voyages, by mining and construction camps, and by those countries where raw milk can not be produced advantageously, and even our larger cities. Therefore, when milk enters so fully into the dietary of our people, it should be clean and pure, instead of being contaminated with health destroying germs, which only get there because of the indifference of the producer, manufacturer or dealer.

MILK MUST RECEIVE SPECIAL CARE.

Every up-to-date dairyman and manufacturer knows that the flavor, aroma, texture and keeping qualities of butter are affected by the quality of the milk and cream; that gassy curd in cheesemaking is due to bad milk; that in the condensery no milk is accepted in which there is an undue per cent. of acid or milk that is off flavor. In the manufacture of these products alone there is an inestimable loss each year to our dairymen through bad milk entering into our products, thus causing a lower grade product to be put upon the market selling for a lesser price.

I would not have you infer that I assume that all milk produced is unclean milk. Nay, far from it. But I do hold that a considerable percentage of the milk delivered to our cheeseries and creameries is not the high class product we would expect from our dairymen in this progressive age. From a newspaper I take the following:

> "In a recent number of a Bulletin issued by the Chicago School of Sanitary Instruction an inspector describes a certain farm where the barn was well built with high ceilings, plenty of windows, and a cement floor. It was newly white-washed. The milk house was clean and the milk cans stood in cold running water, but—the milkers themselves were very dirty and wore dirty clothes. The backs of their hands were covered with dirt, but the palms were immaculate—the dirt on them had been washed off by the milk. The milk stools were so dirty that a quarter-pound of dirt was scraped off the leg of one of them. The milker, who was using it said he had milked eighteen years, but had never cleaned up before milking or washed his hands before or during the operation. Nor had he ever sponged off the cows' flanks and udders."

Knowing something of the conditions and habits of our dairymen, I am free to say, while this appears overdrawn, yet, on a milder scale, it is simply an illustration of a too common occurrence on many dairy farms to-day. The remedy is simple and lies with the dairyman, simply, *clean-up.*

All that I have said regarding production of milk for the cheesery, creamery, or condensery, applies to the production of "market" or "Commercial milk," as it is frequently called. A higher class of milk should be supplied for food, as the raw milk enters largely into the dietary of infants, children, and invalids, and customers expect it to be *clean* and *wholesome.* Owing to the length of time (from 12 to 48 hours) between milking and the time this milk reaches the consumer, there is a great likelihood of its becoming contaminated. It may be clean and pure when it leaves the farm; but in transit, in the vendors' hands, and even in the home of the consumers there may be sources of contamination with which it comes in contact that practically unfits it for food.

Everywhere there is a growing demand for *clean* milk. It may be the buyer is getting as good milk as he pays for. "Certified" milk is the cleanest milk that is on the market; but the cost of production is so great and the sale so limited that it is placed beyond the power of the ordinary dairyman to make it at a profit.

The "pasteurization" of milk for household use is not popular, the heating the milk to a temperature of 160 degrees F. destroys its flavor, and makes it less digestible, and can only be carried on by those firms with large plants.

The "pasteurization" of cream for butter making, as practiced in Denmark, may be effectual in counteracting any ill effects from unclean milk, resulting in producing a superior quality of butter.

No dairyman willingly produces unclean milk, so to my mind there are three causes why unclean milk is being produced:

1st. Because of force of habit (following in the customs of our forbears). 2nd. Ignorance and indifference to sanitary methods and laws. 3rd. Carelessness on the part of the producers, makers and dealers, in not observing cleanly methods in handling milk. This latter should be considered a crime against society.

Where does the remedy lie? I answer in one word—education—to use this word in its broadest sense. It means that much missionary work must be done among the indifferent and careless dairymen before we reach our "ideal." This missionary work must be educative by giving publicity (through the press and platform) to the evils resulting from unwholesome and unclean milk. The necessity of *pure* milk, the advantages of *pure* milk and the methods to be pursued in order to attain the end sought. This is quite essential in paving the way for the second means which must be *authoritative*, and consist in legislative and municipal regulations to govern the milk supply whether produced for the manufacture of butter, cheese, and condensed, or commercial milk.

The public are clamoring for protection, and are entitled to protection from that which is not conducive to their highest interests. In this respect they appeal to the higher authorities with a measure of success. To-day we find nearly all our large cities formulating rules to govern the production, transportation, and sale of milk, with a view to improvement. And where these regulations have been reasonable and carried out by capable inspectors the milk supply has been improved in a great measure.

These regulations usually demand that milk be produced from healthy cows, housed in clean, well-lighted, well-ventilated stables. Fed wholesome food and given plenty of pure water. The cows kept clean and milked in a cleanly way. The milk taken to the dairy room immediately on being drawn from the cow, aerated and cooled to at least 50 degrees F., all utensils coming in contact with the milk kept thoroughly clean, and the milk delivered at the station or factory in the best condition possible.

To meet moderate regulations of the above nature does not require so much of an outlay of capital and labor on the part of the dairyman as we would at first suppose. He may require to put in more windows, install some system of ventilation, do some whitewashing and make a general clean up all round, both in stables and barnyard. I know of some very ordinary stables erected some years ago, in which high class milk is being produced by observing a few of these simple rules.

To carry out city regulations one or more inspectors are necessary, to occasionally visit the farm dairy to see if the producer is meeting the requirements laid down by the Board of Health, or other authority. These inspectors can do good work if not too officious, and are men who understand the conditions under which milk is produced.

The inspector should never allow the producer to feel that he has visited him in the capacity of a spy or a policeman. Our dairymen will resist the "big stick" every time. The idea of mutual helpfulness should always be encouraged. If the producer can be shown how to produce more milk for less money (which in many instances may be done) all the better; but, at least, he should never be left until the inspector feels that he will be glad to see him upon his next visit; unless sure that he is a hopeless case. Along this line a writer has said:

> "Do not expect to get everything at once; remember that the farmer is following the habits of a lifetime, and perhaps of many of his ancestors, and will have to be shown most tactfully. Show him that his stable and milk-room are kitchens in which he is preparing food ready for the stomachs of infants and invalids; you will then be in a better position to ask him to keep them clean at the time of milking and handling the milk."

I like the sentiment of the above lines from the pen of Dr. Santee, Medical expert in charge of Market Milk Investigations for New York State Department of Health. He further says along this line:

> "The Board of Health that does not cause a systematic inspection of the dairy farms furnishing milk to its people is falling far short of its whole duty to the babes whose fate may be at its mercy. Experience has shown that to improve a milk supply by regulations alone is a very slow process. Better a campaign of education all along the line from the producer to the consumer. The happiest results follow a well-managed conference between health authorities, consumers and producers. Such meetings disseminate knowledge, bring about mutual understandings and mutual respect."

While in attendance at the New York State Dairymen's Convention last year I had an interesting conversation with Dr. Santee, and found he was a man of wide experience in these matters, and held most reasonable views regarding this milk question. He is a firm believer in sunlight and fresh air in the stable, and claims that *cleanliness* about the cows, stable and person, together with keeping the milk *cold* after it is drawn from the cow, will do more to insure a pure milk supply than any other measures we may put into practice. He is a great believer also in the covered or small-top milk pail, citing experiments that he had made showing that with their use in the average stables saves about 90 per cent. of the contamination.

It is recognized that much of the contamination of milk takes place during the milking operation, especially if the udder is not dampened by a moist cloth. Just here let me quote from an exchange:

> "A Western Station made an experiment by placing a 4-inch gelatine plate under a cow's udder in a clean stable, holding it there for the time it ordinarily takes to milk, a man going through the motions of milking under the following conditions:
>
> "1. Sides, flanks and udder of the cow were dampened with a solution of 4 per cent. carbolic acid and there was no bedding in the stall.
>
> "2. Those portions of the cow's body were dampened with soap and water, cut bedding was used in the stall, and dust was raised by the man walking in to milk the cow.
>
> "3. No portion of the cow's body was dampened, ordinary bedding was in the stall and the man softened the udder with his hands, dry, thereby setting free all the bacteria on the udder, to fall into the milk.
>
> "The result of the experiment showed that under condition 1 the milk contained 3,200 bacteria per c. c.; under condition 2, 4,500 per c. c.; and under condition 3, 19,000 per c. c."

This experiment proves that dampening the cow's udder before milking decreases the bacteria, and that the ordinary custom of the farmer "softening" before milking, increases them.

The same may be said of allowing milk to stand in open vessels in the stable or dusty atmosphere. At the Cornell Agricultural Experiment Station, it was found that more than 5,000,000 bacteria fell into an open milk can when it was exposed seven minutes in a stable in which the air did not contain an excessively large quantity of dust. When the udder and surrounding parts were wiped with a damp cloth, contamination from this source amounted to less than four per cent. of what it was when the udder had been carelessly brushed before milking. A fly falling into the milk may introduce as many as 1,000,000 organisms. A cow's hair was found to carry 26,000 bacteria, and a small piece of hay that dropped from the cow's body was found to carry more than 150,000 bacteria.

Realizing the truth of the above, it behooves us to pay strict attention to *cleanliness* in the milking operation.

In conclusion let me draw your attention to five requirements to be observed in the production of *clean* and *pure* milk:

1st. The health of the herd and quality of food consumed. An animal that is diseased is likely to give unwholesome milk. For the protection of the health of the herd provide an abundance of fresh air and light. An occasional inspection by a veterinarian will do no harm.

The quality of food and water may have an effect on the health of cows, and thus indirectly the value of the produce. Especial care must be observed to avoid foods that are unwholesome. It is necessary, also, to avoid giving any single food in excessive quantity.

2nd. Cleanliness of the cows and their surroundings. This implies a reasonable degree of scientific cleanliness in the stable.

3rd. This refers to the utensils and their care. They should be constructed in such a way as to make cleaning easy. This demands freedom from sharp corners and cracks, and places that cannot be reached by a brush, which should always be used in preference to a cloth. They should be sterilized or scalded after cleaning and inverted in the sunlight until wanted.

4th. This requires cleanliness and good health on the part of the attendants and milkers, milking with clean clothes on, and special attention should be given to the cleanliness of the milkers' hands and to their care to keep the hands dry when milking.

5th. In the handling of the milk, which means its prompt and efficient cooling, and its storage at low temperature until used. The accepted limit to which milk should be cooled is 50 degrees Far.

Cleanliness and *cold* are two factors that should be observed by every dairyman, as milk produced in a cleanly way will contain fewer germs of contamination, and if kept cold until used many of these troublesome germs will have an unfavorable field in which to multiply and propagate.

Milk produced when the above requirements are observed, even in part, may entail slightly more labor than milk produced under less favorable and wholesome conditions, but it will well repay the cost in a superior article being placed upon the market which will eventually bring a higher price.

Dr. ROBERTSON, Milton: I had not the privilege of hearing all the paper, but I enjoyed very much the part that I heard, and those who heard the paper, if they will go home and do likewise, can easily have clean milk. The Government is teaching us how to increase the flow of milk, and the fat in milk, but one thing that is more important than these two things is to have clean milk. I believe it is very important from the medical standpoint that the milk supply of our cities should be cleaner than it is at the present time. Certified milk should be used altogether, especially for invalids and children. A healthy man may drink unclean milk and not be affected, but children cannot always do this, and people who are not healthy cannot do it, and I hope more agitation will take place for clean milk. I know that in Toronto they are insisting more and more on having clean milk.

Mr. FRASER: I thought milk was clean until I got in touch with these scientific men. While there is a great deal of fault to be found with the milk going into the cities, it is not all the fault of the dairy men and the stables. There is a great deal of fault to be found with the handling after it leaves his hands, and after it reaches the consumer.

Mr. GLENDENNING: I think I am a very good judge of milk, because I have been drinking milk three times a day for fifty years, and I have had some experience during the last ten years travelling around the country on Institute work. I have come to the conclusion that there is a good deal of dirty work. My wife often says to me, "How do you get along when you are away from home for milk?" and I say "I drink it, and when I get down to the bottom of the glass and I see a brown streak then I know that is something that should not be there." I believe something should be done to compel farmers to put on the market a good quality of milk. There is a class of men who shield themselves behind the price. They say, "You do not pay us enough for this." I think there is a lot of milk sold in the cities that should be confiscated. I do not think you should find a brown streak in the bottom of the glass; milk of that kind should be fed to the pigs.

Mr. FERGUSON: It is generally admitted that milk should be improved, and I was glad to note in the paper just read that education is the means now advocated. How can we apply education to the improvement of the milk in the country? I believe organization is one of the important factors.

In order to have milk produced in proper condition the first thing is to know how. The consumers, the handlers, and the producers should be organized, Put them in a position to know how to keep milk clean, and then enforce it. There can be no excuse for the man who knows how but does not do it.

Prof. DEAN: It seems to me we are not making very much progress. What we need is to get right down to some actual practical demonstration of how this can be done. My idea is that we should have in this country a few sanitary milk farms; farms that illustrate in a simple way how clean milk can be produced at a profit. We need a practical demonstration.

Mr. MCPHERSON: I can give the experience of where twenty-five cows produced $300 a cow. The milk was certified and produced at a profit under inspection. The cows were washed every day, and were properly taken care of; the milkmen were not allowed to leave the stable during milking time, they delivered the milk at the door of the stable and then it was aired and cooled immediately. The twenty-five cows showed an actual production per year of $340 each, and they paid a splendid profit.

Prof. DEAN: There are a number of these farms in the United States under the supervision of the medical authorities, but so far is I know there is nothing of that kind here in Ontario.

A MEMBER: What did that man receive for his milk?

Mr. MCPHERSON: 10 cents a quart.

Mr. STEPHEN: With the knowledge I have of the milk supply of the city of Montreal, farmers shipping milk into that city and selling it wholesale are making a good profit on their cows, and they are selling milk very low in bacteria, and milk that shows over 3.5 per cent. butter fat and over 8½ per cent. solids. There are no regulations enforced in Montreal. I have in my mind two farmers in one community; one has produced high-class milk and the other has not, and the one that is not producing good milk is constantly having trouble. We consider this unfair to the man who is aiming to meet the regulations which are required, to not make the other fellow do the same thing. The man who produces clean milk should get more for it. There are certain horses that you have to use the whip on, and there are certain men that you ought to use the whip on, and it is for these men that we want the law.

In New York and in Chicago they have regulations that all milk that comes into the city at a temperature higher than fifty degrees is liable to be thrown into the gutter. I think the sooner we make better regulations, the sooner will we better our milk supply, and I believe eventually it will be money in our pockets.

HOW TO INCREASE THE MILK YIELD.

BY GEO. RICE, TILLSONBURG, ONT.

How shall we get a better cow? To this question I fancy the cow's answer is: "Get a better man to care for me."

There are few, indeed, who seem to understand that business. We may talk about balanced rations, etc., but what we want is a balanced man to feed the ration. When a man knows *how* to feed he will know *what* to feed. Almost any one can throw the feed in the manger, but something more is required. The feed needs to be given with judgment learned by experience and gained by observation of the habits and characteristics of the animal.

Stockmen know this is true of all classes of animals, but even more necessary in the dairy cow, because heavy production must be an enormous tax upon her. If a man wants to be an engineer he must serve an apprenticeship and become familiar with the mechanism of the machine. He learns the various uses of the different parts and also learns that all parts must be kept in order and run smoothly. Simply a loose nut or some trifling thing wrong may lead to disaster. Again, a man who would become a skilled cheesemaker must gain by experience, even more than through being taught the theory of the business, as so much depends upon what almost seems an intuition as to what action must be taken at different stages of the process of cheesemaking.

But the cow is vastly more intricate than any machine, and the process of making her milk is beyond the knowledge of man. Man has invented many things, but is never likely to invent anything that will turn fodder, such as the cow consumes, into such a fine food as milk.

In order that we may more fully realize the great work the cow does in producing her milk, and so be better able to understand what we are demanding of her, we must consider the *actual* value of her products.

A good cow will produce two, three, and even four pounds of butter fat a day. More indeed in pounds of fat than any other animal will produce from the same feed in flesh; but the butter fat has a value per pound five or six times greater than meat. This is by no means all, because after the butter fat has been taken from her milk there still remains solids of food value greater than any other animal could produce from the same food.

Again, a good cow will produce 1,500, 2,000, and even 3,000 lbs. of milk in a month; in other words, more than her own weight, and sometimes double her weight. You may say there is a good deal of water in this milk. Well, there is water in almost all things. Her own carcase has a large per cent. of water, and for that matter so has your own carcase. Water has a place, and even a value. We will call upon the man of science, and he will tell us that 1 quart of milk has a food value as great as 1 lb. of the best beef; in other words, 2½ lbs. of milk are equal in food value to 1 lb. of beef. When a cow produces 2,500 lbs. of milk that is equal to 1,000 lbs. of beef. 5,000 lbs. of milk=2,000 lbs. beef; 10,000 lbs. milk=4,000 lbs. beef; 20,000 lbs. milk=8,000 lbs. beef; 25,000 lbs. milk=10,000 lbs. beef.

Marvellous as it may seem, cows have produced these amounts of milk in one year, and even more. We would go a long way to see a beef animal that could grow 10,000 lbs. of beef in one year; it would be a marvel that would produce 1,000 lbs. of beef in one year.

The milk cow has shown her ability to produce food for mankind equal to what twelve or fifteen beef animals would do. Is it possible for her to consume as much food as twelve or fifteen? No. As a matter of fact, her stomach has no greater capacity than one good beef animal.

It is apparent then that we must look farther than the food alone for source of production in the dairy cow. It is also apparent that to produce largely, the dairy cow must have great vitality and constitution. The logical conclusion is that in order to get a better producing cow we must build up for vigor and a strong constitution. Has our treatment of the dairy cow been such as to make for these essentials?

My folks were among the old settlers of this Canada of ours and I have been told how, when feed ran short, and I suppose that meant the straw stack; trees were cut down and the cattle were forced to eat brouse in order to keep from starving. In my early life the straw stack was considered good enough for both food and shelter for the cow. Even now, although we have through the country fine barns, the cow does not receive the treatment she should. We might as well try to take the hump off the back of a camel with a poultice as to seek to increase the capacity of a dairy cow by feeding her on a semi-starvation ration with lack of shelter and care. When we consider the heritage of the cow, her former treatment, feed and care, we must concede that she has been producing all that we have a right to ask of her when she gives us 3,000 lbs. of milk a year. If we want more we must give her better care.

The dairy cow has never had fair deal. While the horse eats the hay and oats, the pigs eat the corn, and the steer eats hay and chop, the cow has to take what she can get. Some people are indeed under the impression that it does not pay to give a cow good food. Ye Gods! And yet we are able to prove that a *good* cow can produce milk in one year a food value twelve or fifteen times greater than can a steer.

How does she do it? There are some people possibly still in this world who believe those great milk records are made by forced feeding and cramming the cow. Well, I believe it works all right to force feed down a chicken, but then there is this difference, a chicken has a gizzard and a cow has not, but only a stomach, a stomach which was originally intended for her use in producing milk for her calf. If we want her to produce those large quantities of milk for the benefit of mankind, then it is up to us to aid her as much as we can by giving her a succulent ration, in order that she may get the required nutriment with the least possible effort, and also see that she gets the proper care and a few other things necessary to her.

We must also remember that heavy production gives her a keen appetite, and care must be taken that the stomach is not overloaded. A cow would, if given the feed, eat a great deal more for two or three days than is good for her. You will better understand this if you just note how you feel yourself after gorging, say on Christmas Day. One day will not do much harm, but continue to gorge yourself for two or three days, you will likely want the doctor or undertaker.

The same with a cow. The feeder must know within a reasonable limit when his charge has had enough. Little signs tell us. The avidity of the animal, and more particularly the condition of the excrement, tells the experienced feeder how the digestive organs are working, and the niceness with which all these organs work in harmony will aid the cow to do her best work.

The importance of this will be seen when we consider that inside the well-fed animal is from 150 to 200 lbs. of fodder in various stages of digestion. But it is not the food alone we must consider. Water is quite important for a large producing cow. She will need daily from 150 to 200 lbs. It is plain that a cow cannot take all this water into her system in one or even two drinks, indeed too much water taken at once acts as a purge and means serious derangement of the system.

Food and water are important to the welfare of the cow, but we know we can feed two cows practically the same feed, and yet one will produce more than another from the same feed. From what source does this come? It is generally said, one cow has the milk-giving "function" to a greater extent than another.

What is "function?" It is a nice, big sounding word we generally use when we are "stuck." The Indians simply give a grunt in a similar case. One expression gives us about as much information as another.

There must be some source from which this increased production comes, else the cow practically performs a miracle.

In some cases the increased production comes from the animal drawing upon its reserve, and her own body weight is reduced in giving large milk yields. But there are cases again wherein this consideration cannot explain the heavier milk yields from one cow more than another. There is still one important thing a cow uses which is not often considered, and that is *air*. Air is vital to the existence of both animal and vegetable life. A man can go a long time without food, some have fasted forty days, but deprived of air, man would soon collapse. A cow, to be a good one, *must* have large lung power. The air which she takes into her lungs oxidizes the blood, promotes circulation and digestion, and produces the power that enables her to do the greater work. We thus see the importance of pure air. If the air is impure it does not have this element of oxygen so essential to animal life and well being. Just in the proportion that we reduce the purity of the air we reduce the efficiency of the cow.

A cow to be a good one must have large lung capacity, but in order to produce well she must be supplied with a sufficiency of pure air, else her superior lung capacity is of no advantage to her.

A case to illustrate this occurred with me three years ago. I was testing two cows at home for over a month; one gave more milk and butter fat than the other right along. They both had the same air supply, standing side by side, but one was able to use much more than the other as her general conformation showed she was a cow of large lung capacity. The same two cows were brought down to Guelph in the Dairy Test, both were equal in heartiness and feeding well, but at this time the cow that had always produced the heaviest did not produce any more than the other. The reason, I consider, is that the stable where the dairy cows are kept at Guelph is so constructed that pure air cannot be supplied to the cow at her head without reducing the temperature of the stable too much. The ceiling is too high for one thing, then the cows are tied up against a solid wall and their breath had not a chance to get away from them, and they have to breathe much of the same air over and over again. A cow taking too much impure air into her lungs is injured rather than benefited. The way many stalls are built a cow should breathe through her tail, as the air has a better chance to circulate behind.

Men who have done much testing know that heavy milk cows are greatly affected by hot weather in the summer. I was testing a four year old the latter part of June, 1907. She was making 2.5 lbs. of butter fat a day. A very hot spell came on, she went down to 1.85 lbs. per day, due to nothing I am sure, but the heat. This is only one instance of many that go to show the same thing. In this case the cow was using her lungs to the best advantage when the weather was cool, but taking into her lungs so much air that was necessarily hot, it, with heat from the food she consumed (and it was only grass) made her too hot. It is just as detrimental for a cow to go to the other extreme and have it too cold. With pure air, not too cold nor yet too hot, a cow does her best. The oxygen derived from the pure air goes to the nerve centres, producing in her energy necessary for heavy production.

In the last analysis, then, a cow's capacity depends upon her lung power largely. The cow, using as she does, so much water and air, which in the winter is necessarily cold, shows us the necessity of keeping her in a comfortable place if we want milk, which in our winter means inside most of the time; or if she must be let out for water, do not leave her standing out in the cold.

It is the habit of a cow to want to drink after eating, and for that reason, if for no other, water should be in the stable all the time, and it is very little trouble to bring in the pure air. It, indeed, needs no pipes to carry it, and after showing how important it is to production as well as the health, anyone is very foolish who does not make the best use of it.

Too often those things that cost us nothing are not appreciated at their value. I cannot go into the question of temperature much at this time, but will say it is better to have a temperature in the stable between 45 to 55 degrees, rather than between 40 and 75 degrees.

Avoid great changes, and especially avoid drafts. A draft in a temperature of 75 degrees is as harmful as one at 45 degrees.

If to have pure air it is necessary to lower the temperature, remember that pure air is of more importance than a few degrees of temperature. If you were milking a cow and the temperature is below 40 degrees, put a blanket on her. If her body is kept warm the air can be cooler about the head.

We must be more particular in handling cows if fresh in winter, as a cow consumes more water and air when producing heavily.

If the cows are dry in the winter, to produce well next summer they will do much better if put in trim for the work. Good feed and pure air builds up the cow's system while she is dry, replenishing the drain made upon her by her former production, and giving her more strength and vitality to withstand the strain which the demand of maternity and production will make upon her.

A man is never paid better for any feed and care he gives a good cow than that given when the cow is dry. Proper care and feed while dry is vital to heavy production.

Not only will the cow be much better for work, but if we are to get better cows we must breed them. A calf from a cow that is in proper condition and possessing energy and vitality will be much more likely also to possess a good constitution.

We want, and must have, cows with superior constitution, which is partly a matter of birth, and partly a matter of development. A calf born with good vitality can, with proper feed and care, be developed into an animal with good stomach and lungs.

The somewhat bulky feed recommended for the dairy calf develops a good stomach, and in order that the feed may be properly digested, sufficient pure air is supplied, the lungs will be developed with use, and this gives us an animal possessing some of the essential things necessary to make a good cow.

CAUSE AND PREVENTION OF COMMON AILMENTS IN HORSES.

By J. Standish, V.S., Walkerton.

It is with some trepidation I undertake this task, although it is gratifying to me to know that the management have taken such a view of this matter that we shall consider the causes and prevention of the diseases. Generally, the desire is to consider only the diseases in their treatment. The diseases named here are all preventable, and it is more profitable to prevent diseases than to cure them. When disease exists it is advisable to secure the services of a competent veterinary surgeon rather than to hazard the life or utility of a good animal by allowing unskilled persons to doctor it, or even the owner to take the chance, as there cannot be any doubt that men who have the same amount of intelligence to begin with and apply that to the study of diseases do know much more than the ordinary farmer or breeder. No matter how long an experience the farmer or breeder may have had the educated man having a knowledge of the experience of many experienced men, which knowledge has been acquired by study of the works published by the great authors is able to sift out more knowledge from one case than the uneducated man could out of fifty.

But every owner can easily acquire sufficient knowledge as to cause and prevention of diseases to enable him to prevent any of the diseases we are to consider. I am not to discuss the treatment, but that will be taken up afterwards by Dr. Reed. I would like to impress upon you the advisability of acquiring a knowledge of the cause of the disease and the ease with which they can be prevented.

The Minister of Agriculture stated a few days ago that the horses of the Province of Ontario are worth $80,000,000. That is a very important asset, and if we can make them more valuable by preventing them from becoming diseased it will be a great benefit to horse users. The diseases which we are to discuss are indigestion, colic, lymphangitis, heaves, azatouria, and joint ill.

Indigestion is recognized in two forms, acute and chronic.

ACUTE INDIGESTION is caused by errors in feeding, in permitting the animal to partake of much succulent food when not accustomed to it. The horse that is accustomed to dry food should not be permitted to partake of wet grass or roots or should not be given mashes in excess or a large quantity of nutritious food. Another cause is feeding oats and exercising the horse too soon afterwards before partial digestion has taken place. Digestion is aided by fluids which are secreted into the mouth, stomach, and intestines, and this fluid is not secreted or provided by the system by reason of the quantity of food consumed but by reason of the amount of properly regulated exercise that the animal receives. If an excessive amount of food is given to the animal there is no extra quantity of juice supplied, and that food instead of digesting ferments, gases are generated, these gases distend the stomach and give rise to great pain. It is the practice in some districts to give the horse an extra quantity of concentrated food in the morning or at the time it is desired to perform some extra labor. It is immediately hitched up, and after being driven some distance the animal exhibits distress, gives evidence of excruciating pain, and that is due to the fact that there is not sufficient juice to digest the food, and fermentation sets in. The same condition will give rise to flatulent colic.

CHRONIC INDIGESTION is frequently due to derangement of the teeth or glands in connection with the mouth, the teeth being deranged prevents the necessary mastication, and the derangement of the mouth in that way prevents a free flow of saliva, the food is not fully mixed with the fluid that is necessary for its complete digestion, and that gives rise to a deranged condition of the stomach. It is also frequently caused by excessive quantities of innutritious food.

When large quantities of food are permitted, the animal gorges itself, distends the stomach in that way, deranges the action of the stomach and intestines, in that way causing indigestion. Symptoms in this disease are not so extreme, still it leads to a condition of deranged poisonous condition in the stomach and intestines in that way creates many diseases that are fatal. There are many people who believe the more they can induce an animal to consume the better results will follow—a mistaken idea that causes a very great loss, not only in food, but in the condition of the animal.

When I speak about properly regulating the food and giving proper food in only sufficient quantities, I do not wish to leave the impression that the horse should not be well fed.

It is well known that the fluids have the power of aiding in converting the food into an assimilable condition. It is not the quantity consumed that benefits the animal, but the quantity assimilated. If too great a quantity is consumed then a less quantity will be made assimilative, and the mass will ferment and cause disease.

If an animal has been fatigued and deprived of food and water for a considerable time, and then an ordinary quantity of food is permitted, decomposition will take place by reason of the weakened condition of the stomach, and if the horse has been deprived in that way it would be better to give a small quantity of food and a small quantity of water frequently, until hunger and thirst are satisfied, than to allow the animal to satisfy itself quickly.

To prevent chronic indigestion it is advisable to make a careful examination of the mouth, and if any condition exists there that prevents mastication, such as irregular teeth, then correct that so as to prevent the disease. It is customary for many people to feed their animals hay the whole time. I have known remarks of this kind: "That man is a mean man, because he does not give his horse as much oats when they are idle as when they are working," or, "He does not permit them to eat hay all the time." I think more digestive diseases have been created in this way than in any other. I say that heaves is a dietary disease, and is always caused by improper feeding, and I would make this rule, "*Never feed unless the animal has been about six hours without food.*" It is advisable that the stomach regain tone, and almost completely digest the contents, before more is permitted, and for an idle horse it is well to remember that while in active labor or exercise it requires sufficient nutritious food to build up the various parts of the body, but so soon as it is laid off work the animal does not require so much food, and it is advisable not to waste food and injure the animal by giving an excessive quantity. Feeding large quantities of even clover hay will not supply the animal with all it requires, and it would be well to supplement it with something more concentrated. It is a mistake to practise to leave hay in the manger before the animal all the time. That causes a great many diseases.

COLIC. There are two kinds of colic, flatulent and spasmodic; the causes are much the same as in cases of indigestion. If care is taken to prevent indigestion, colic will not be induced. In spasmodic colic, the symptoms are acute, but are not continuous as in flatulent colic, where we have distention of the abdomen with gas, which causes alarming symptoms and death.

HEAVES is a dietetic disease. It is caused by neglect and thoughtlessness, in feeding large quantities of succulent food, inducing the animal to gorge itself and distend the stomach frequently, especially where palatable food is fed, or innutritious food is given, as over-ripe timothy or clover hay, badly cured. The best way to prevent it is to feed a balanced ration. Give only sufficient quantity to nourish the animal, and never feed to excess. Water frequently and exercise regularly twice a day, two or three hours in the forenoon and the same in the afternoon. You are aware of the fact that none of us are positive what the pathological condition of heaves is. It has been discovered in some instances that two or more air cells in the lungs will be ruptured and form an enlarged cavity there. It is thought that this is the result of the disease, not the cause. In all cases of broken wind or heaves there is a primary cough known as broken wind cough, and afterwards a double heaving of the flank during expiration. Before there is a double breathing, and when the cough only exists, or in the early stages of double breathing, we have always an aggravated condition when the animal's stomach is gorged. Then the extreme distention of the stomach stretches the nerves supplying the digestive system, which is the cause of heaves, and the only thing to prevent it is to give the animal only sufficient nutritive food and water to sustain him, but not sufficient to enable him to over distend his stomach.

Lymphangitis. The next disease to be considered is a disease of the lymphatic system, the system of small vessels accompanying the veins. These vessels take up the poisonous material out of the body and convey it into the circulation to be excreted by the various excretory organs. To have the system working freely they must have the pressure of the muscles. It requires contraction and expansion of the muscles to force this fluid out of the system. If the animal that has been fed sufficient nutritive food to nourish it in active labor, and is deprived of the exercise and still fed the same nutritive food, it causes these vessels to become congested, and the nerves are irritated, causing great pain and swelling, most frequently in the hind leg, but is may be also in a fore limb.

This is known as Monday morning disease, weed, shot of grease, etc. The way to prevent it is to lessen the quantity of nutritive food when the animal is compelled to be idle, if only over the Sabbath. A horse in good condition, well nourished, and of the heavier type, is very susceptible to this disease after a day or two idleness if heavily fed. To prevent it, reduce the quantity of nutritive food Saturday evening and Sunday, and then have the animal go to labor on Monday morning as usual, and I would advise giving a bran mash on Saturday night, without any grain, and on Sunday morning, one-half the usual quantity of grain, at noon one-half the usual quantity, at night the full feed, and on Monday morning the full feed and proceed to work. In case the animal has never had an attack of this disease this is a preventive, but where there has been previous attacks, then the animal is more susceptible to the disease, and consequently will require more attention, and I would add some saltpetre to the mash on Saturday night.

Q.—How much saltpetre would you add?

A.—Four drams for an ordinary sized horse of mature years.

Q.—Have you used Sulphate of Soda?

A.—No. I would not use it for this purpose. Saltpetre reduces the amount of fibrin in the system, and it is preferable for this purpose.

Azatouria. This disease is always caused by want of exercise, and is always prevented by regular and frequent exercise. I have never known an animal to be attacked, except on the first exercise after an idle spell. Very frequently owners will tell you that the animal never left the stable gayer than he was at this time, and just went a short distance and had these symptoms. Want of exercise has always been the cause of it. An ounce of prevention is worth a pound of cure in some diseases, and in this one a grain of prevention is worth a ton of cure. It has been said by good investigators that the body is a factory of poisons, and these poisons must be eliminated from the system or disease results. The lymphatic system aids in the elimination, and should be kept active by careful regular exercise.

When the horse has been in enforced idleness after being well nourished for a time, then the factory continues working without expelling these poisons, and on the first exercise the action of the muscles, and the activity of the organs, produce a very rapid flow of these poisonous substances into the circulation, and that so acts on the nervous system that it causes paralysis of one or more parts of the body, generally a hind leg or both hind legs. To prevent the disease give frequent exercise, which stimulates the heart, liver, stomach, and lymphatic system. If an animal has to be deprived of exercise by reason of a wound or any other cause, bear in mind that it is more susceptible to this disease in forty-eight or sixty hours than if the idleness had been for a considerably longer period, so if you deprive the animal of exercise be very careful in the first exercise. Give short periods, remaining near the stable for the first or second times, and if given two or three times a day for one or two days all danger will be over.

JOINT ILL. This is due to a germ that enters the body generally by the umbilicus or navel. After entering the system the germ develops, in large numbers and generally concentrates in the region of a joint causing an abscess. Sometimes they gather in the soft tissues, therefore the prevention would be to keep the germ from entering the system; and in order to do that, it is advisable to have all the surroundings of the young foal in as healthful and clean a condition as possible. Polluted stables should be cleaned thoroughly with boiling water and some strong antiseptic, such as some of the preparations of mercury, creolin, or carbolic acid. Lime sprinkled over the place is good. After the birth of the animal supply some antiseptic solution to the navel. Creolin or carbolic acid five per cent. solution. There is but little danger of the germ entering the system after the umbilicus heals.

Q.—Is it possible for a foal to contract that disease before birth?

A.—It might be possible, but I do not know that I have ever known it. Until there is a sufficient development to form an abscess it may not be recognized as joint ill.

Q.—We have known cases that developed when preventive measures had been used?

A.—I believe it might be possible for an animal to be effected before completion of delivery, but not until after delivery has commenced.

Q.—How do you account for a horse not contracting heaves on the Western prairie?

A.—The feed is not very palatable, and the water is equal to the feed, and when the horses go there from the East they are all the time endeavoring to get sufficient to nourish themselves.

Q.—Horses in the stable under similar conditions in the East do not have the heaves?

A.—It is a fact, I have never seen heaves in an animal out in the West. Still I have been told that some that have been brought from the West, that had the disease when they went there, had it when they came back.

Q.—What is the proper quantity of hay and oats an ordinary farm horse should get?

A.—I suppose you mean a good agricultural horse of 1,400 lbs. in active labor. He should have sufficient nutritive food to sustain him in good vigorous condition. It is impossible to lay down any quantity that will be sufficient in all cases. You should study the individual horse, but generally about three gallons of oats per day divided into three feeds. Some people prefer bran and flax seed. I must say that I like a little for my own horses, and on Saturday night a mash. Give about the quantity of hay they will eat in forty-five minutes in the morning, thirty-five minutes at noon and one hour at night. Some roots, such as sugar beets, mangels, turnips, or carrots are beneficial when fed twice a week, a gallon at a feed would be sufficient to nourish four ordinary agricultural horses in idleness that is getting only sufficient exercise to keep healthy.

Q.—Which would you prefer,—mangles, turnips or carrots?

A.—A. Good Swede turnip and carrots during the period the animals are shedding their coats. In the absence of the turnips I prefer sugar beets. all roots are beneficial when fed with judgment.

Q.—Do you not think the elimination of those quack teeth doctors would have a great deal to do with the prevention of bad teeth?

A.—I quite agree with that idea. The class of men who hunt around the hotel stables and want to doctor the horse's teeth do a great deal of injury. I have known a number of horses ruined just because the owners did not know whether the horses teeth needed treatment or not. The molar teeth are all grooved, and if you file those grooves down the horse's teeth are ruined forever. Not long ago, I met a gentleman who claimed to be a superior veterinary dentist, and I asked him how many teeth males should possess and how many females should possess, and he did not know the difference between the general condition of the teeth in the male and female. If you find such people as that going through the country, it would be well to be careful how you have them do anything for your horse, particularly when it is such an easy matter for the people of Ontario to acquire a proper knowledge of these things by taking a short course at the Ontario Agricultural College, or what is better a full term course.

Q.—Is impure air in the stable the cause of indigestion?

A.—It certainly is. Pure air is absolutely necessary for the well-being of man or beast. When the air is impure there is a depressing effect on the system of the animal which prevents the heart and respiratory organs from acting freely, and that affects the digestive system.

Q.—Would ten lbs. of ensilage in the morning and ten at night do harm to a horse's teeth. They say the acid is strong?

A.—I do not think it would be injurious to the teeth; I have never fed it; but ten lbs. at night and ten in the morning would be more than I would like to feed a horse in actual work. I would not care to feed ensilage more than two or three times a week.

Q.—Can the heaves be cured after the air cells are affected?

A.—No; after heaves are established, they are incurable at any stage after double breathing is established; but they may be alleviated so that only an expert could be able to detect them.

Q.—Does it hurt a horse to feed him roots twice a week?

A.—No; but you might feed so many at a time as to derange the digestive system and induce diarrhoea, colic, indigestion, or some other trouble.

Q.—Would a small quantity of saltpetre once a week be injurious to an animal?

A.—If an animal has had exercise and is in good health it does not require it; if it is not in good health a small dose of saltpetre will not hurt him. There are cases where it will aid in preventing lymphangitis, but it should not be given in debilitating diseases.

Q.—Will you say a few words with regard to diphtheria in horses; a number of horses in our neighborhood have died from it?

A.—Perhaps cerebro spinal meningitis would be a better term. It is due to polluted water or food. It is certainly advisable where there is suspicion of it, to employ a capable veterinary surgeon. You might be mistaken between influenza and diphtheria. What are the symptoms?

Q.—I have not had personal experience, but, my neighbor lost several horses; the veterinarian said it was diphtheria?

A.—The greatest difficulty we have to contend with is in the diagnosis of disease.

Q.—Is there any cure for lockjaw?

A.—Many cases have recovered. There is a serum that is injected now that is said to be a specific.

Q.—Is there any preventive measure for distemper except keeping the horse from being exposed? Will it effect a good healthy horse as well as a poor or exhausted horse?

A.—No; an exhausted animal will be more susceptible to the action of the germ than a vigorous one. It is a disease that is caused by a specific germ, and after one attack an animal is not likely to be attacked a second time, although they have been. Any horse is susceptible to an attack of the disease.

Q.—Have you had any experience in feeding alfalfa hay; would you prefer it to red clover?

A.—Yes, I would prefer it to any other hay; more care is required in feeding alfalfa. Alfalfa that has been frozen is not good. It is a splendid food, but requires some judgment in feeding it. It is a better balanced ration than red clover. Horses fed it do not require so much grain food as when fed timothy or straw.

Wm. Smith, Columbus: There is a difference between indigestion and colic. I have no hesitation in saying they can be prevented, and I need not waste any time in talking about the causes of these diseases, because Dr. Standish has gone fully into that.

The causes are very fully understood by the farmers in this country. One of the difficulties is that they do not always put their knowledge into practice. We know that horses should be regularly fed and watered; we know that the feed they get should be of good substance. These are two things that we all know about, but the trouble is that we too often forget these points. It does not do that a horse should be fed at eleven o'clock one day and at one o'clock the next day. It does not do to have any haphazard way in feeding or watering. We should feed and water regularly, and when we know that the feed we give the horse should be good and of a proper substance, then I think we have gone a great way in preventing some of the diseases that we were speaking of this afternoon.

Colic and indigestion arise, as far as my experience goes, from very much the same source. Indigestion is a disease farmers have paid well for. Too many horses have died, and too many farmers are too willing to try some of the home remedies for five or six hours, and when they find their efforts are no good, then they hurry off for a veterinarian. By this time the horse is practically dead, and they imagine the veterinary surgeon is no good. Prevention of these diseases is in the way we feed and the way we water and the substance we usually feed. Reference was made this afternoon to the quantity of hay that should be fed. Many a noble animal in this Province has gone down because his owner was too good to him, and I believe we are very apt to err more often on that side than on the other. It is possible that the farmer can help colic. I often do that myself by using sweet nitre and laudanum and baking soda, but it does not always cure. I never monkey with indigestion. I employ those whose business it is to look after diseases of this kind. Lymphangitis is a Monday morning disease. Many of us think that if we are extra good to a horse on Sunday that we are going to put him in a better position to commence his week's work Monday morning. We sometimes imagine we can fatten a horse in twenty-four hours. You will have very little of this disease if you give saltpetre Saturday night. I often use that with sulphur. Saltpetre, sulphur, and sometimes Epsom salts.

Q.—How much?

A.—You can't hurt them. Mix the three of them together, give a fair table-spoonful and I have never found any bad results.

Q.—My veterinarian says saltpetre is a dangerous drug in the farmer's hands?

A.—I have used pounds and pounds of it, and I never lost a horse yet with it.

Q.—He says the farmer often gives it, and it does more harm than good?

A.—I do not think so. If your horse once gets lymphangitis you may stake your existence on it he will get it again, and the chances are that before many years have passed by he will have a large leg and will be practically a ruined horse.

One word in connection with joint ill, and I think I will be voicing the sentiments of many when I say, from this disease more loss has occurred to the farmers of this great Provice than any other disease. I can well remember a number of years ago that I was losing one colt after another, and was almost discouraged from continuing breeding. When I was a boy I never heard about the germs, and I never saw any. I did not see how these little things could do any harm; but it was pointed out to me in clear terms that these germs were the cause of the disease, and I have never lost but one since from that disease, and that was my own fault. I would almost differ from Dr. Standish. I do not believe it is possible a colt could take that disease before birth, and I do not believe it is advisable that any work should be done until the cord is broken, and I prefer it to be broken of itself rather than to be cut. I use diluted carbolic acid, and that is something you have to be very careful with, because if you use it full strength you will inflict a very great injury. Any disinfectant that is advertised, I think, will answer the purpose. Attend to it at once. Delay is where one of the mistakes is made. You think almost any old time in the day will do, but you must attend to it at once and continue this three times a day until wound is healed. This disease is usually found when the mare is in the stable. And if you go to the Western prairies you do not see much of this disease.

I think heaves can be helped by careful feeding of hay and oats, and by not letting the horse have too much water at once.

Anything I have said had been from direct experience, and I have paid dearly for it. You can prevent these diseases to a great extent by first finding out the cause.

So long as the world lasts we will require veterinary surgeons, and through our own carelessness we will be compelled to turn to them for help.

TREATMENT OF COMMON AILMENTS OF HORSES.

By J. Hugo Reed, V.S., Professor of Veterinary Science, O.A.C., Guelph.

You have had two very excellent addresses, and Mr Smith told you it cost him a great deal to find out these things. It cost Dr. Standish also a great deal, and it also cost me a great deal—my time and money attending college—and it has cost me a life time work, and I don't know nearly all yet. Mr. Smith has been a very successful handler, breeder, and importer of horses, and he acknowledges he has learned a great deal by experience.

I will speak in the first place of chronic indigestion. It will be a little difficult to speak to the treatment without first considering the symptoms, but I do not think we have time to go into the symptoms. Indigestion sometimes has a tendency to constipation; improperly masticated food will be noticed in the faeces, and the horse will occasionally show slight colicky symptoms. He may consume a reasonable amount of food, but he does not look well. His hair is long and dry; he has not the life and ambition he should have.

What about the treatment? In the first place, have his mouth attended to, because in a large percentage of cases there is trouble in the mouth. Have his teeth attended to, and employ a competent man to do it. Then it is a good practice to administer a purgative; aloes, eight to ten drams, or, a pint and a half to a quart of oil, and follow that up with a tonic; but in the majority of cases we find all the horse requires is to have his teeth dressed. If the horse requires a tonic, perhaps the old tonic of iron and gentian is the best; one dram of each three times a day. I do not think we can get anything better.

Acute Indigestion, Flatulent Colic, Spasmodic Colic. I am sure that the difficulty you will find and the difficulty the ordinary veterinarian finds is to make a correct diagnosis in the early symptoms of these diseases. The symptoms in the earlier stages are so similar that it is not possible to say just which disease the animal is suffering from. Fortunately, in the earlier stages the treatment for the one would do for the other. More horses die from acute indigestion than from any other one disease. The modern veterinarian treats this disease very largely by administering medicines hypodermically, that is just under the skin. It requires special skill for this mode of administration, and I will confine my remarks to the treatment the ordinary stock owner or ordinary farmer would be likely to have about the place; and while it may appear selfish, my advice is that when you have a horse that is sick with a well-marked disease, do not fool with him yourself, but send for your veterinarian if you can get him. For acute indigestion there is no drench which can be given which will give as good results as raw linseed oil and turpentine, generally known as spirits of turpentine.

I am a believer in large doses. In giving turpentine I give large doses, and I would give from two to four ounces of turpentine, according to the size of the animal, in conjunction with a pint to a pint and a half of raw linseed oil. In the first place the animal should be made as comfortable as possible. Put in a box stall or out in a paddock. The stall should be well bedded and the horse kept from injuring himself. If the distress is very great and the animal is suffering intensely, we give a separate dose of an ordinary colic drench.

It is wise in this case to refrain from giving opium, because there is a tendency to constipation, and where constipation exists we do not give opium but we give belladonna; fluid extract of belladonna one ounce, sweet spirits of nitre two ounces, in a pint or half pint of cold water. We give belladonna and ether to ease the pain. The action will only be temporary. If the disease is not cured and if the cause of the pain and distress is not removed, we will have to repeat our anodyne doses probably several times, and we would repeat the first dose of turpentine and oil in the course of a couple of hours, if necessary. When the symptoms have become allayed, and the animal is easier, it is a good practice to give a purgative. We do not recommend the administration of purgatives in this disease during the early stages, but it has been shown that the disease is caused by errors in feeding. We have practically cured the disease, and we give a purgative to remove from the intestines the material which is partly or wholly digested in order to prevent a recurrence of the trouble.

Spasmodic Colic. In the first place the symptoms, and in the second place the treatment are very largely the same as for acute indigestion, and it is hard to discriminate between the two diseases. In spasmodic colic in 99 per cent. of the cases no treatment is required. We were told when we were students at the Veterinary College that if we were sent for to attend a case, the symptoms of which led us to suspect spasmodic colic, to get there as quickly as we could for fear the horse would be better before we got there, and we would get no credit for our treatment. There is a great deal in that. Some give soft-soap, and one thing and another, and the horse sometimes gets better and they give the credit to the dose. Recovery will take place in from a half hour to an hour without any treatment. It is a spasmodic disease, and what causes the symptoms is the spasmodic contraction of a portion of the small intestines. This causes intense pain. When that is removed the disease is cured. Give him the same dose you give to relieve the pain in indigestion. The colic drench is belladonna, opium and ether. In this case we do not object to giving opium because there is not the same tendency to constipation.

Q.—What is the action of aconite?

A.—Aconite is the most prompt sedative we can give, it is a medicine that decreases both the number and force of the heart beats. There is probably no drug more abused than aconite. Some persons spoke here about saltpetre being abused. It is not in it with aconite. It is a drug that should never be used except by a person well versed in its actions, because the advisability of administering aconite is always indicated by the condition of the pulse. If the pulse is strong, frequent and bounding we are justified in giving aconite. Aconite very quickly deteriorates, it becomes inert, and if it were not for that there would be very many more horses die than die now. It is not at all exceptional for a farmer to keep a bottle of aconite in his stable, and if the horse is sick he gives it.

Fortunately, by the time aconite has been in the stable for a month or two you might just as well give so much water. It does neither harm nor good, and that saves a great deal of trouble that would otherwise result. It is one of the most active poisons. Large doses kill very quickly, and small doses hasten death, unless the pulse is strong and bounding.

Q.—What is likely to have been the cause of the contraction of these small intestines?

A.—Over-feeding, the same as would cause other cases of indigestion. For instance, if you turn a horse out on grass, it may cause acute indigestion or it may simply cause spasmodic colic. I have known horses that if you allow them something to drink after eating a meal they would be almost sure to have colic, and any changes of feed is likely to cause colic.

Q.—Supposing my horse has been standing in the stable two or three days, and getting very light feeds, and the next morning I want to start on a twenty-five or thirty mile drive, would you increase your feed of oats that morning beyond what it had been getting during the idle days?

A.—Supposing the horse had been well fed and working steadily, but standing two or three days, there is a case in which he might get a full feed, because he is accustomed to his full feed. It would be probably a little more intelligent not to give him so much. But if it is a horse that had been idle and fed little grain for a considerable length of time, weeks or months, possibly, and then you want to take a long drive, there is where the danger comes in of giving a full feed, because the horse's digestive organs as well as his muscular organs have become accustomed to perform certain functions, and a horse that is not accustomed to digesting oats or other grain in considerable quantities and then is given a full grain feed, especially if hitched up and driven, will be very likely to give trouble. It is a mistaken kindness.

Q.—Would you give a small feed on starting out and another feed at mid-distance?

A.—No; give a small feed, and then make your twenty-five miles, and give him another small feed; and if you are going to remain at that stable over night give him a larger feed then.

Twenty-five miles it not too far for a horse to go between meals; it is only a three or four hour jog. Six miles an hour is only a jog. Any horse should go twenty-five miles between feeds, and I would consider it much safer to drive the full distance than to stop and let him eat a small feed half way, unless you can afford to stop a couple of hours. Twenty-five miles is not a big drive for a horse in half a day—that is, an occasional twenty-five miles. To drive that far every half day is more than any horse could stand.

Q.—What is the matter with a horse when he bloats after a day's work?

A.—It is a form of indigestion.

Q.—Would you recommend a little Epsom salts for a horse when you are changing his feed?

A.—It would not be injurious, but my opinion of giving drugs is different from what I have heard to-day. My opinion is that a healthy horse requires no medicine. If a horse is ill, then he requires medicine. I have most decided objections to the periodic or regular feeding of saltpetre, or resin, or sulphur, or anything else. A healthy horse requires no medicine, and is better without it.

Q.—How would the pulse act in spasmodic colic?

A.—During the spasms the pulse becomes frequent and full. Normal pulse is from 36 to 40. In spasmodic colic the pulse might run to 50 or 60, and when the spasm passes off we would have a period of normal pulse. It very quickly comes down to normal, and then when it has another spasm, up it goes again.

Q.—How high would you let it go before you try to check it?

A. We do not try to check the pulse; we try to ease the spasm. We give opium, belladonna, and ether.

Q.—At what stage of the trouble would you give aconite?

A.—I would not give it at all.

Q.—Suppose it ran up to 80 or 90, and is full and bounding?

A.—You will not make any serious mistake in giving a dose of aconite then.

Q.—I generally give about 30 drops of the tincture of aconite; is that too much?

A.—I would not take the value of any horse in my stable and give him 30 drops of Fleming's tincture of aconite, because I would expect it would kill him. If the aconite had been improperly kept, it might not do so; but if you gave a horse 40 drops of a good quality of Fleming's tincture of aconite it would not be alive in two hours.

Q.—What drugs are dangerous to give a mare in foal?

A.—Aloes is considered dangerous, or any drastic purgative. Unless there is some well marked disease it is better not to give medicines to a pregnant mare.

In case of chronic indigestion would you consider hot applications of any assistance?

A.—Hot applications are palliative and soothing, but it requires a very active man to keep the applications on a horse that is suffering from spasmodic colic. Unless properly applied they are more harmful than beneficial, but when properly applied they are all right. But how are you going to apply them when the horse is liable to throw himself down quickly and paw and jump to his feet again, and drop down in some other place?

Q.—How about the trocar as a last resort?

A.—You have reference to acute indigestion, or flatulent colic, in which the large intestine is violently extended with gas, and in a case of that kind I would have no hesitation in using a trocar if the distension was so great that respiration was interfered with and we were afraid death was going to take place quickly. Where we had no time to wait for medicine to act, I have no hesitation in using the trocar, and I suppose there is no person knows that better than Dr. Standish. Some years ago when I was veterinary student, I was practising with Dr. Standish. and veterinary science was not so far advanced as it is now; and when we got a case of this kind, I would want to puncture, but he would not let me. But when I got away I was the boss, and I started to puncture with very good results. Of course you must puncture on the right side. Now we use medicine, and that obviates the necessity for puncturing. We give a grain and a half of eserine or a grain of arecoline, which increases very rapidly the peristaltic action of the bowels, causing an escape of gas, and it is very seldom that we require to puncture. In some cases these drugs do not act, and then we puncture. If we get a case where the symptoms are excessive on the start we puncture right at once. There is little danger in puncturing provided we have observed antiseptic measures with regard to our trocar. The worst I have ever known to follow is the formation of an abcess.

Q.—What is the cause of tetanus?

A.—It is caused by a germ that gains entrance to the circulation from a wound, or in other ways.

Q.—Do you contend it is contagious?

A.—No, it is not contagious in the general sense of the term. It is necessary for this germ to enter the circulation, before symptoms of tetanus will be established. One of the best marked cases of tetanus I ever saw was in a colt less than twenty-four hours old. It got the germ through the navel, and it acted very quickly.

Q.—You would not contend that over exertion would bring it on?

A.—No. It is impossible for over exertion to produce tetanus.

Lymphangitis was spoken of. The treatment of this disease consists, in the first place, in the administration of an active purgative; eight or ten drams of aloes, and a couple of drams of ginger, and follow this up by a dose of four drams of nitrate of potash, night and morning. Apply heat to the affected part from the groin down to the hock. Hot water is best or bandages packed with warm batting or wool. The advisability of bathing depends to a considerable extent upon the circumstances. If it is cold weather, and the stable be not practically free from draft, I would not bathe, because the reaction will do more harm than the hot bath will do good: but if it be warm weather or in a comfortable stable, then bathe well with hot water, and after bathing apply liniment. The ordinary soap liniment that you buy in any drug store does very well. We can make a liniment by taking an ounce of oil of turpentine, about two drams of ammonia, and add to that enough water to make half a pint. That makes a reasonably fair stimulant for purposes of this kind.

Azoturia. We hitch up a horse that has been standing idle for a few days and start him out on the road. He may be looking extra well, and after you get a few hundred yards or possibly a mile or three miles, and I have known it to be as much as ten miles, you will notice the animal going lame, generally on one hind foot. You are inclined to think he has picked up a nail, you examine the foot and go on. The horse begins to perspire most profusely, and you allow him to stand. He is suffering pain and may fall down in the harness and possibly get up again, but he may not be able to rise again. You will notice in most cases a swelling over the loins. If both hind legs are affected there will be swelling over both loins. The animal's pulse will increase in frequency and strength and the respirations are increased on account of the pain.

Now what about the treatment? We are supposed to know whether the horse is liable to an attack from the fact that he has been standing idle for two or three days. At the very first symptoms cease driving, get him to the nearest stable you can and make him comfortable, and in the majority of cases that is all you need to do. It is good practice to give a purgative, and it is also good practice to put a little counter irritation over the kidneys, mustard mixed with water. A peculiarity about the symptoms of this disease is the urine is very highly colored and very thick, resembling to a great extent treacle or strong coffee.

If you keep the animal going until he falls and cannot rise you must get him on a stone boat and get him to shelter. Then he should be given a purgative. If he is staggering, and still on his feet, endeavor to hold him there and put a counter irritant over the loins. It is a disputed point as to whether the animal should get diuretics. There is a medicine called albumone that many veterinarians claim to be a specific for this disease, but that has not been my experience. I give several doses of iodine of potassium. If the animal makes an effort to get up, help him to his feet. If we get him on his feet we will have a recovery inside of forty-eight hours; but if instead of getting strong he keeps getting worse, then the case is going to be fatal. I have never known a fatal case when the driving ceased as soon as the first symptoms appeared. The trouble is, the horse often becomes affected when he is a half a mile or two miles from home. He may be going away from home, and the driver turns him around to get him home, and that is where he makes the mistake. The horse should be left where he is. If it is warm weather, leave him in a fence corner; 'f it is cold weather get him to shelter.

Q.—Is a horse liable to a second attack?

A.—I have in mind one mare that has had several attacks, but as a rule that is not the case.

Q.—When driving moderately is a horse less likely to attack?

A.—In some cases it may. I have known horses to take this trouble in going to the back field to plow, when they were just walking, and I have known horses to take it in the stable where they have got halter cast and in exerting themselves to get loose brought on the trouble. Easy driving would have a tendency to avoid the disease.

Heaves. This trouble has been reasonably threshed out. Of course there is no cure for heaves. The symptoms of heaves can be mitigated by careful feeding. Small quantities of roughage and a larger quantity of grain and dampening everything you feed,—hay, oats or anything else, and it is a better way to dampen the feed with lime water. Unscrupulous horse dealers know how to check symptoms of heaves. They administer certain drugs. Large doses of arsenic, will remove symptoms of the disease. It has been asked how is it that horses that have been taken to the North West do not show symptoms of the heaves?" I think it is on account of some action of the climate. It acts on these horses as a medicine, and removes the symptoms, but does not cure.

Joint Ill. The question was asked, if it was possible for joint ill to be contracted by a colt before birth. In my opinion it is not. I do not believe it is possible for the animal in utero to contract joint ill, but I do believe that it is possible for it to contract it during the birth.

We sometimes get symptoms of the disease early in life, so early that we think that the animal must of been born with it. As a rule the animal is three or four days old before the symptoms of the disease are noticed, and in other cases it has shown within a day or two. I have heard people claim that they have noticed it within a few hours. I consider there is practically no cure. Prevention has been spoken of. Dressing of the navel with an antiseptic solution of carbolic acid;—five per cent of carbolic acid or five per cent zenolum, or any of these tar products. I prefer a solution of bichloride of mercury. I make a stronger solution than most people care to use. I make it one to two hundred and fifty and dress the cord or opening three or four times a day with this, until it is healed and dry. We may have a score of mares foaling, and they may all foal under exactly the same conditions. One or more of these foals may suffer from joint ill although preventive measures were adopted.

Q.—Would you employ disinfectant measures as soon as the navel is broken?

A.—Yes, as soon as possible after birth.

Q.—Have you known a foal born in the fall to have joint ill?

A.—Yes, but it is not as frequent as earlier in the season. Some think that the germ that gives this disease is peculiar to the stables, that is not my opinion. I think probably it exists in stables more plentifully than it does in the ground, but I think it exists in the sand. If we had animals foaling on fields where there was nothing but grass, and grass covered everything, I think we would not have any joint ill; but in most pastures there are bare spots, perhaps there has been salt there, and the animals have eaten the grass off and left the ground bare, and I think the germ exists there the same as it does in the stable. Of course I have no proof of that except experience.

Q.—How would it do to sear the navel with a hot iron?

A.—I do not think it would be satisfactory. I would not expect as good results from searing as from the result of antiseptics.

Q.—What is your opinion, should water be in the reach of horses all the time?

A.—I think it is the proper thing to do. I would have it in my stable if the stable were warm enough so the water would not freeze. Unless the horse is very hot I think he might get all the water he wants.

Q.—Do you water a horse when he is warm?

A.—Unless excessively hot I would. If I had been following the hounds for an hour or two, and the horse was pretty hot when I brought him in, I would not give him all the water he wanted. I would give him a little. If I was driving to town and came back, and he was sweating some, I would give him all the water he would drink.

Q.—And oats after?

A.—Yes.

Q.—Would you put him in a cold stable?

A.—Not if I had a warm one. If my stable is cold I will cover him. Theoretically speaking, the horse should not be watered after he is fed, because if you press into a full vessel even more, something that is already in the vessel must escape; and it is claimed in watering horses ofter feeding, you force the food out of the stomach, and we should water the horse before feeding.

Q.—How would you do if he would not drink?

A.—My experience is that it is very hard to teach a horse to drink before meals. I have not succeeded in doing it, and I have tried very hard. My instructions to the stable man is, to offer the horse water before and after. They will not drink much before unless they are very warm, but they will take a good drink after. My horses get grain and mangles or sugar beets, and that is all they get at noon. They get no hay.

Q.—I had six horses lame in the shoulder at one time?

A.—I would be of the opinion that they were lame in some other place except the shoulder; it might be they had liver disease.

Q.—Would not three or four days rest be too much to give a horse at one time?

A.—No; mine often get a week. But I keep them in box stalls, and when they are idle they get fairly well fed.

CAUSE, PREVENTION, AND TREATMENT OF MILK FEVER IN CATTLE.

By H. G. Reed, V. S., Georgetown.

Milk fever is a disease too well known to a great many farmers. It is a disease, as you know, peculiar to newly calved cows, and rarely attacks a cow before calving, although sometimes it has been known to do so. It has been the source of great loss to the farmers of Ontario in the past, because until the last eight or ten years veterinary science had not been able to cope successfully with the treatment of that disease. Changed conditions have appeared on the scene recently, and now we can cope with it.

The cow in your herd that is most pre-disposed to milk fever is almost invariably the best cow in the herd; she is certainly not a very poor kind of cow. If you have a cow that is a poor milker she is not likely to suffer from milk fever, or if your cows are in poor condition they are not likely to suffer from milk fever. The cow that is a heavy milker is most likely to suffer from this disease; therefore it behooves the man to look after the heavy-milking, well fed cow about calving time. I have no hesitation in saying, and my experience justifies me in making the statement that the careful dairymen need hardly ever have a case of milk fever to treat. I honestly believe that ninety-nine cases out of every hundred might have been prevented if the cow had been carefully handled. If a cow is in good condition and a heavy milker, she should not receive any stimulating food for two weeks before calving; that is to say, she should receive no pea meal or wheat or corn or any heating feed of that kind. A great many dairymen are anxious to bring their cows to the highest condition at calving time, and many a valuably cow's life has been sacrificed because of that idea, on the part of her owner. Of course it is a good practice to bring them up in good condition, but a couple of weeks before they are expected to calve you should feed them on clover hay, silage or roots, and withold rich or stimulating food. See to it that a couple of weeks before calving and a couple weeks after calving her bowels are kept in fairly relaxed condition. It may be necessary to give her a couple of doses of salts before and after calving.

Some people milk a newly calved cow out completly, drawing all the milk out of the udder. I have been told by some of the most experienced dairymen in Eastern Ontario that since they have quit adopting that plan they have had fewer cases of milk fever on their hands. It is an unnatural condition for a cow's udder to be emptied out completely. In natural conditions the calf does the milking, and you can readily understand a calf would not do that. A calf would take a little milk at a time, and the cow's udder would not be emptied out all at once, and we ought to approach as nearly as possible to natural conditions. Consequently the men who milk their cows out slightly after calving have gone a long way in arresting the danger of milk fever developing. Those are in my opinion the two most pre-disposing causes of milk fever, especially stimulating food. I cannot emphasize too strongly the idea that it is a bad practice to feed heating and stimulating food to a heavy milking cow in good condition for at least two weeks before calving and a week or ten days after calving.

Treatment Of Milk Fever. At the present time the veterinary surgeon has every prospect of being able to treat milk fever successfully, provided the animal has not been dosed by somebody else before he is called in. I think a farmer may be justified in resorting to all the methods he knows to treat a sick animal, but in the case of milk fever I would say: Do not treat that animal;—simply leave her alone, and send for a veterinarian if you value the animal's life. It is absolutely dangerous to attempt to pour anything down the animals throat, even if it is only pure water. The cause for that condition is simply that a cow that has milk fever has more or less lost power of movement; the muscular systems are to a certain extent paralyzed, and all the muscles of the body are influenced to a certain amount by paralysis. You can handle their eyeballs and they make no resistance whatever. You can tell she is alive by the deep heavy breathing, but that is the only sign of life you can see. She is sometimes able to stand up, but I would say do not attempt to drench her even then because the muscles of the throat are just as thoroughly under the influence of this paralysis as the muscles of the limbs, and no animal can perform the act of swallowing when there is paralysis of the muscles of the throat.

The fluid passes the windpipe before it comes to the gullet; the windpipe is the first opening the water comes to and when there is paralysis of the muscles and you pour water in she cannot perform the act of swallowing, and then the water is just as likely to run into the windpipe as it is to run into the gullet, and I have known many and many a cow to stretch herself out and die inside of two minutes because the lungs had been filled up with water and the animal choked to death. If you administer a drench in the early stages of milk fever you are not likely to have that trouble, but you are likely to cause serious trouble later on; therefore I say, do not attempt to drench a cow suffering from milk fever.

Q.—Would it be safe for an ordinary farmer to use a rubber hose?

A.—Yes. I do not think it would require much skill for an ordinary farmer to pass a piece of hose to the cow's stomach and administer liquids in that way; he would not be very likely to make any mistake. Veterinary surgeons have introduced oxygen gas into the udder for the cure of milk fever, and that system is almost universally successful. We simply milk out all the four quarters of the udder, and we fill it up with pure oxygen and we expect to get the very best results in almost every case.

Q.—What are some of the indications of milk fever?

A.—The first indication is a certain amount of nervous excitement, she has a wild expression in the eye, she is nervous and irritable; later she begins to move around in an uneasy way in her stall; then you will notice that the hind quarters are beginning to lose power and she will stagger in the stall and probably fall down. The chances are that being frightened she will make an effort to stand up, but will soon go down and will be unable to raise; she will probably lie on her brisket in an unnatural way, with her head thrown on her ribs; she is not able to hold her head erect. As the disease advances she will fall over on her side anl be unable to raise her head at all.

Q.—What effect has oxygen on the cow?

A.—Pure oxygen gas has a wonderfully reviving effect on all animal life. It has been used in the medical profession for a great many years, and physicians have known for a long time that patients in danger of dying from collapse have been revived by the injection of pure oxygen into the system. It has a wonderful influence on animals suffering from collapse. The udder is not the seat of the disease in milk fever. It is a disease of the nervous system, beginning at the brain and extending through the spinal cord through the whole system, and we do not treat the udder because that is not the seat of the disease. It is a disease of the nervous system; there is no question about that.

Q.—Do you ever apply ice?

A.—I would to the head, certainly. It has a cooling effect where the cow is very much excited, and sometimes in milk fever cows are very much excited; I have seen them knock their horns off in the manger. We invariably put ice on the head of an animal in that condition.

Q.—Would not heat be better?

A.—In any condition where the brain is violently inflamed it is better to apply ice.

Q.—How do you discern the difference between parturient paralysis and parturient apoplexy?

A.—In paralysis there is loss of power, but there is no loss of consciousness; with apoplexy we have loss of both power and consciouness. A cow suffering from milk fever does not recognize her newly born calf, a cow suffering from parturient paralysis is conscious and knows all about her calf; and if you go to remove the calf she will show every indication of being aware of it.

Q. Would not milking for a length of time previous to calving prevent milk fever?

A. It might certainly arrest inflammation of the udder. I do not think it would have any effect whatever in preventing milk fever setting in.

Q.—Could an amateur administer gas?

A.—I can hardly understand a complete amateur having either the appliances for administering the air, or the oxygen; still, if he had the instruments and had the oxygen and knew how to use them, I do not see why he should not be able to use them successfully. I know that amateurs do a good deal of that sort of thing. They do not know how to use a bicycle pump to pump air into the udder of a cow, and I have known cows to be destroyed by the use of that instrument. It is not absolutely necessary that we should use pure oxygen; at first we did not think it advisable to use anything else, but we have been using atmospheric air very successfully instead of pure oxygen; but we always force that air through a medicated cylinder in order to make sure that there are no germs put into the cow's udder along with the air.

Robert Miller, Stouffville: This used to be one of the most fatal diseases that men breeding cattle supposed to furnish a heavy supply of milk were subject to, and some professional gentlemen found this disease could be easily cured, as Dr. Reed has just explained to you. It is scarcely necesary for me to discuss it from an experience standpoint, because lots of people will tell you that a man who breeds shorthorn cattle could not be expected to have much experience with milk fever in cows, and there is more or less truth in that; but we have occasionally a case of milk fever in a cow that is not a very good milker. I sold a heifer a year ago last Toronto exhibition; she had her first calf, and she had milk fever. The man did the best he could, and gave her genuine up-to-date oxygen treatment, but he lost her just the same.

We often have garget in the udder, and I believe that a greate loss occurs from garget in the udder than the disease we have been discussing. I got the experience of one of the largest farmers in Great Britain, the chief of the Pagham Harbor Company, where they milk hundreds of cows, and where they have 2,000 breeding ewes. He said they had the greatest difficulty from ewes going wrong in the udders and suffering in the same way. Instead of giving large purgative doses they force the cows for ten days before calving, to drink no water unless it is mixed up as a sort of mild purgative drink; they get nothing else. If they become feverish they take some of the medicine, if more feverish they drink more; just let them drink this and nothing else. Take a pail of water, an ordinary patent pail, and put in that pail of water ¾ of a pound of bicarbonate of soda, dissolve it; then take another pail of water and put in it 1¼ lbs. Epsom salts and dissolve that; then have your tub ready with four pails of water in it and into that tub pour the other two pails and do not allow the cows or ewes to drink anything else but that, and you will find that the fever in the udder will entirely disappear. I bought a cow at a sale in Hamilton, and paid a high price for her; she was within a week of calving. I hurried her home because I knew it was dangerous to delay. She was promising to be a big milker, her udder was quite large; she got an inflamed udder, and it was so painful that if you would put your fingers near her udder she would almost go out of her head, and I thought it was time to try and do something. I immediately made this mixture and gave it to her. Of course we watched her all night, and within twenty-four hours after that was given her it would make any man good to see her, and we never had any more trouble with her. I remember that case very well, because I was deeply interested. I have seen many cases since where it worked out just as well as it did in that case, and I have never seen a case that failed to effect a remedy. ¾ of a pound of bicarbonate of soda dissolved in a pail of water, 1¼ pounds epsom salts dissolved in another pail of water, and then mix that with four pails of water. Do not put the first two pails together before you put them with the other water because they will effervesce and destroy them to a certain extent.

Q.—Do you drench your cows when you give them the mixture?

A.—They always drink it; if they won't drink it at first, they will when they get a little more feverish, and the more fever they get the more they will drink.

Q.—You use six pails of water?

A.—Yes, leave it there until your cow drinks it, and in the case of sheep leave it in the pen and let them drink all they want of it; it won't hurt them or any animal.

W. F. Stephen, Huntingdon, Que.: When the Secretary sent me the programme and asked me to address this Winter Fair, it occurred to me after looking over the list of subjects, that they could not have selected more interesting or vital questions than those on the programme, particularly this one of "Milk Fever."

My neighbors as well as myself have lost a number of cows through milk fever. We have a number of heavy milking cows in our section. Many of our dairymen deliver milk in the city of Montreal, and have cows coming in at all seasons of the year. I have frequently asked myself why it is that more cows go down with the fever in the months of July and August, because these are the months when our farmers have more trouble with milk fever than any other time of the year. I have only had one case in the winter and one in the fall, and both recovered. I have had no fatal cases for the last ten years. We bring most of them through by the air treatment. The last cow I treated myself. With the first case I had, after the air treatment was adopted, I called in our veterinarian, who, with a bicycle pump, rubber tube and a teat siphon, filled the udder with air and in two hours the cow was milking. A year ago last September another cow, a large milker, contracted the disease, and I administered the air myself with a bicycle pump and in two hours we had the cow on her feet; she went down quickly, and when a cow goes down quickly one has to act quickly. In this case we could not get a veterinarian for three hours, and therefore I handled the case myself. Dr. Reed has covered the points very ably, and there is no doubt that prevention is the best remedy. My idea is to keep them in the stable in the day time and on bare pasture at night, and on no account allow a cow to gorge herself, especially within a day or two before calving. Keep the bowels open. This requires considerable watchfulness on the part of the attendant. I think it is best to feed a little bran and oil cake or other cooling and laxative food. I do not think we need fear this disease as much as we did formerly, on account of the discovery of the air treatment which is certainly a great boon to the dairy farmers. I have never known a case to occur in a cow that was a poor producer. I believe we are approaching a time when our cows will be better producers than they have been in the past. If you use common sense and carefulness you can treat this disease by using precautionary methods and using the air pump, but on no account use the teat siphon unless it is sterilized.

Q.—Did you ever know of a heifer with her first calf having this disease?

A.—No; it usually occurs in cows after they are four or five years of age.

Q.—Have you ever known a cow to have it the second month after calving?

A.—No, I have known them to have it two weeks after.

Dr. Reed: I never saw milk fever develop three months after calving. A veterinarian usually has a pump and an oxygen tank and they fill each quarter full of this air. There is this danger in using a bicycle pump; we pump in the same air that is surrounding the animal and there is no doubt there is more or less germ life in that air, and I have known of cases where farmers have killed their cows in that way, because the cow was in a filthy stable and they pumped in the air of the stable, and the cow was dead in ten hours.

Q.—Would there be any danger of that if the cow was outside?

A.—Not so much.

CAUSE, PREVENTION, AND TREATMENT OF CONTAGIOUS ABORTION IN CATTLE.

By H. G. Reed, V.S., Georgetown.

Abortion is of two kinds, contagious and non-contagious. You all know that any pregnant animal that has met with an accident or injury, is liable to abortion. That, of course, would be simple abortion. Then, again, we have animals that suffer from abortion because of the character of the food on which they are fed, as some food containing ergot. Once in a while you will have a cow that will never carry her calf the full term, and you cannot tell why. Even in a case where you know a cow has sustained sufficient injury to cause her to abort, it is good practice to remove her from contact with other animals, because there is a sympathy existing among cattle, and cows have been known to abort simply because the cow in the adjoining stall has aborted; and it is also well to remove all evidence that an abortion has taken place.

It is all too true that our herds are subject to contagious abortion. It has been a source of great loss to dairymen. It is one of the worst diseases that a dairyman has to fight. It is a germ disease, and the animal must have been brought in contact with the germ that produces the disease or she would not abort.

Q.—Has the germ ever been isolated?

A.—The germ has not been successfully isolated. Still, we know it is a germ. My brother says he thinks the germ has been identified. We know the fact of the germ's existence. If a cow aborts from contagious abortion, then, of course, you know the germ exists in your herd and you must use the utmost care. Cows contract the disease from the other animals, and a man may carry it to healthy cows unless he changes his clothes after attending to a cow that has aborted. I think the most frequent cause of infection is from bulls that have come in contact with affected cows.

The cows affected should have the infected parts washed two or three times a week, with a strong disinfectant solution in order to remove all traces of the germ. The internal organs should be washed out with a solution of carbolic acid.

Q.—When does the abortion occur?

A.—It usually occurs before the fifth month. There is a difference between abortion and premature birth. Abortion is where delivery takes place before the fœtus is alive. If a cow gives birth prematurely, the calf may live.

Q.—Is there any difference in the liquid around a calf in an abortive cow and a healthy cow?

A.—I think the germ is in the liquid.

Q.—How much carbolic would you use in the liquid to wash the animal?

A.—To wash the external parts I would suggest you use a 10 per cent. solution—10 parts of carbolic acid and 90 parts of water; for internal use that might be too strong.

Q.—How can you tell the difference between contagious abortion and simple abortion?

A.—If a man has had four or five cows abort in his herd, then he has very much reason to dread the presence of contagious abortion.

Q.—If the afterbirth comes away clean is not that a sign it is not contagious abortion?

A.—As a rule the afterbirth does not come away clean with contagious abortion, but that does not prove she is not suffering from contagious abortion.

Q.—Is it a fact that feeding a cow over stimulating food will cause her to abort?

A.—I do not think it would, but there is a possibility it might.

Robert Miller, Stouffville: This is a most serious problem we have placed before us to solve in connection with cattle. I believe greater losses are suffered from this than from all the other diseases combined in connection with cattle. We get some strange experience in connection with it, and we have good reasons for thinking that a cow that has come through the contagion and got better is free or immune from the disease. I have failed to hear of one man that has lost more than two calves from one cow. I have never yet met a man who said that he knew of one cow that had lost more than two calves after they had gone a certain length of time.

I believe that it is like typhoid fever, and that contagious abortion will run its course. It looks as if it works out its own cure. It is a most dangerous and destructive disease, and you ought to take every possible means of putting it down, even if you have only a suspicion that you have it. A man using a bull on cows, where there is suspicion of her having the disease, should not use the bull on other people' cows under any circumstances.

Q.—They will, though?

A.—They should not do it, it is a case of man's inhumanity to man; a man is not a good neighbor that will do it, even if he has only suspicions that the disease exists he should not do it. If a man brought a suspected cow to my bull I should tell him to take his cow off my farm as quickly as he could, and I would go after him and disinfect the ground his cow walked on. You cannot be too severe with a man who will bring his cattle near yours when there is danger of your cattle being infected by them.

Q.—How would you proceed against a man like that? I have a case of that kind here.

A.—If there is no law to go after a man that would do a thing of that kind knowingly, then there ought to be a law just as soon as our Legislature can make it.

Mr. Johnston: Suppose nothing at all is done, and no mode of checking, how long do you suppose it will take to go through a herd and be completely gone?

A.—I have known the disease to practically destroy the usefulness of a herd for three years, and then many of these cattle were destroyed; they never can become any use afterwards, because the germ that creates the disease has destroyed the breeding organs of the female.

Q.—Would the beef from a cow be considered diseased meat?

A.—Not at all.

Q.—Is this disease contracted alone from contamination?

A.—I think in every case you will find there has been contagion.

Q.—A beast getting hurt and aborting, would that be contagious?

A.—No.

Q.—Then the next day or two you have another one or two?

A.—I would try and put the first one away, no matter how honest she was about it. If within the next day or two there was another one, then I should say that cow should be considered as having the disease; and I should separate them and disinfect these cows, and disinfect the stalls, and I would begin to take more precautions by giving the other cows something to prevent them from following her example.

W. F. STEPHEN, Huntingdon, Que.: I quite agree, it is a germ disease. I do not think we have laws in the statute book to prevent spreading it. Personally I have suffered from that very cause. I have seen a great deal of it in my neighborhood. Five or six years ago is seemed to be contagious in the community, and the whole country for miles and miles, herd after herd suffered. It went through the stable, but it did not attack every cow. In some stables probably one-third of the cows were free from it, and in other stables almost every cow.

There is no disease we need to dread more than this. I have not feared tuberculosis and I have not feared milk fever, but I have feared this disease, and I do not think there is any disease that will reduce a splendid dairy herd quicker. Six years ago my neighbors had it on either side of me. We had only one veterinary in the neighborhood, and as I had learned the way of removing the afterbirth my neighbors would send for me, and afterwards I would attend my own cows without removing my clothing, and the wonder to me is that I did not pollute my own stable with the germs.

When I found out the danger of it I stopped tending other herds, and Dr. Spencer, who was in the employ of the *Farmers' Advocate* at the time, came to my place, and he said "Look out or you will have it in your herd just as sure as you are standing there." I asked him what was a good remedy, and he said, "A very good remedy is manufactured by the West Medical People called the West Fluid, and I will have them send you a package," and in a week's time a package arrived. Within two days I had two cows with the disease. I immediately used this preparation, as advertised, isolated the cows, and put them in another stable. I put some of it in the water troughs in front of them, and used it very freely, and I was not long in using up a quart can, and I immediately sent for five gallons. I said "If I can stamp this out I am going to do it," and used that preparation. I have used it ever since, and I have had but very few cases.

Q.—What is the name of the remedy?

A.—West's Fluid, manufactured by the West Chemical Company. There are many other remedies, carbolic acid is good, only more expensive. Zenoleum, I think, is a safe thing for a farmer to use.

Q.—Did you inject it?

A.—No, I used lime in the stables. These two cows that aborted were served within two days of a cow that had been brought to my place and served by my bull, and I believe that in that way they contracted the disease. It did not make any further headway in my stable, because I believe I used the disinfectant so thoroughly that I killed any germ life that existed.

As to making animals immune. Dr. Robertson, of Waukesha, claims to make animals immune by a system of inoculation. I am only telling you this, I do not know anything about it, but if there is a remedy of the kind it is certainly a valuable discovery. Dr. Robertson claims he has a number of testimonials, but of course we all know it is not difficult to get them in this age. If you have a cow that gets this disease you should put her to beef as quickly as you can. If you have a valuable cow be careful.

CAUSE, PREVENTION, AND TREATMENT OF INDIGESTION IN CATTLE.

By H. G. Reed, V. S., Georgetown.

You all know that the stomach of a cow is quite a different organ from the stomach of a horse. Cows are said to have four stomachs, but that is not strictly true; a cow has only one stomach divided into four. We will just speak of these apartments as first, second, third, and fourth stomachs. You all know the function of the first part which we call the paunch. It is simply a receptacle for holding the partly masticated food, a kind of store-house where the animal lays up food that it will chew at leisure. So far as disease is concerned, there are just two portions of the stomach that are of any particular interest to the farmer, that is the paunch, and the third stomach, so we will just talk about the first and third stomach and say nothing at all about the second and fourth, because from the stand-point of disease they are of very small interest to the ordinary farmer. We may have a diseased condition in the paunch if the animal gets a very large meal of some dry food and the process of digestion ceases. You will then likely have an impacted condition. If the animal has had a large meal of some succulent food for instance, clover or turnip tops, and then the process of digestion ceases, you are going to have in all probability a case of bloating, because that succulent food ferments rapidly, and when the process of digestion ceases, gases will be thrown out and your cow will bloat. A case of bloating in a cow may be serious or not; sometimes it is very serious and at other times not very much so. If your cow is only bloating in an ordinary way, tie a stick across her mouth having it around her horns and turn her out for exercise and very often she will relieve herself in that way. Sometimes it is a very serious condition, and if the animal is bloating very extensively, and if the skin seems to be blown out just as tight as possible, and you have difficulty in finding out where the hip-bone is, then you have a bad case of bloating on your hands. I believe as a rule a man with a sick animal is acting wisely and in his own interests when he sends at once for a veterinary surgeon. Occasionally, however, there is a case where there is not time to send for a veterinarian, and then you have to act for yourself when you have a case of bloating to that extent. The only way to successfully treat that animal is to puncture right through the skin into the stomach and allow the gas to escape.

Q.—Would you not administer something that would be as good as the knife? I have used both.

A.—If you got the patient early enough in the disease it is possible to counteract the formation of gas by administering medicine.

Q.—I have a very simple remedy?

A.—If a man has a simple remedy he might better not operate; I have no knowledge of any remedy.

A Member. It is good for everybody and everybody is welcome to it, I got it simply after I was very nearly at my wit's end. It is one tea-cup-full of coal-oil. I repeat the dose in two hours if the first one does not relieve.

Dr. Reed: This gentleman says no matter how violent the bloating may be you are justified in administering a tea-cup full of coal-oil and taking chances for recovery.

The Member: I do not think there is any chance at all, because I have used doth the knife and the coal-oil.

Dr. Reed: I do not know the medicinal effects of coal-oil; it is a substance I have never used at all.

A Member: Do not be afraid to use it.

Dr. Reed: Puncture on the left side always; the trocar and cannula will cost from 50c to $1.25.

A Member: I have seen a jack knife and a goose-quill used.

Q.—Would it be dangerous to puncture the animal lower down?

A.—Not especially dangerous. I do not think it makes any difference for two or three inches. So long as you are pretty well up to the hip-bone. You need not fear the after results; many an animal has been saved by puncturing. If we have an impacted condition of the stomach we cannot perform any reasonable operation to relieve that. No farmer would be justified in cutting into the stomach and removing the solids. Professional men sometimes have to do it, I have removed the full of a washtub, but it is not often that that condition arises. As a rule, if an animal is suffering from impacted condition of the stomach, a good strong purgative will remove it; give two or three pounds of salts.

Q.—Have you ever had them that you had to use more than that?

A.—Often, but I would not give more than that at once.

Q.—Would you repeat a dose of salts at all?

A.—I do not care to go on continuously giving the same drug. It would be good practice to use some other purgative, such as oil or aloes. Repeated doses of the same medicine is not considered good practice.

Q.—How long have you had them off their feed and come all right with your treatment?

A.—Two or three days.

Q.—Would you be astonished to know that I had one last winter that was two weeks and never touched a mouthful of food, and I gave twelve pounds of salts altogether and a gallon and a half of oil.

Dr. Reed: Are you quite sure that the trouble was in the animal's paunch; do you think it was not in the third stomach?

A.—I am sure it was in the paunch.

Dr. Reed: The third stomach is where the food receives its final operation.

The Member: Excuse me; that is where the trouble was. I will take it back, I made a mistake.

Dr. Reed: More animals die from impaction of the third stomach than from any other digestive trouble. If you had a bloated animal suffering from impaction of the rumen you will know it at once; but this attack of the third stomach comes on very insidiously, and the farmer does not realize that he has a sick animal until it is very far advanced in the disease. The first symptom of that would be what we call a capricious appetite. It will take its dinner all right, but does not care for supper, and possibly be ready for breakfast, and then would not care for its dinner the next day. The animal does not show its usual inclination for food. Whenever you are feeding an animal, and that animal shows an indisposition to eat anything you are justified as a rule in coming to the conclusion there is something wrong with that animal's digestive system. If that be the case, if the stomach be tired and wants a rest, skip two or three meals and give good purgative doses, and the chances are that animal will be restored to its former digestive strength again. Many farmers prepare something nice and tasty and give to the animal, and in all probability that will increase the trouble; the disease will develop, and in the course of two or three days you will find the animal has no appetite at all. You will often find the contents of the third stomach become so dried out that it is hardly possible for medical treatment to restore it to its normal functions, and they cannot perform any operations to relieve that condition.

Q.—Is there not a little opening that the food will sometimes go through and the impaction still remain?

A.—That is quite right, there is a passage through the centre of that organ through which the food can continue to pass, and very often we find slight attacks of diarrhoea in a patient of that kind.

Q.—You say you would consider that a helpless case?

A.—I do not say it is helpless, it is difficult, and the most skilful treatment sometimes will not save the animal.

Q.—The medicine will pass through and will not effect that hard stuff?

A.—Yes; you can get medicine to pass through and not affect that. When the stomach is digesting there is the peristaltic action of the muscles, relaxing and contracting, and when the animal gets an attack of that kind its muscles are paralyzed, and we have to administer purgative medicine and also a nerve tonic in order to stimulate the action of the stomach. We administer strychnine in all cases of that kind in order to stimulate the vermicular action of the stomach. A careful feeder need seldom have a case of impaction of the manyplies. A man who watches his animals can see this trouble in the beginning, and I don't think there is any trouble more easily removed if taken in time.

Q.—Have you ever known them to come that way off the grass?

A.—Yes, it is not at all an unusual condition to occur on the grass, especially the first grass in the spring where they have access to a lot of dry grass that has remained over.

Q.—What is the best thing to do?

A.—As soon as you notice the condition give a good dose of purgative medicine, and also give strychnine or nux vomica.

Q.—Would oil or salts be the best purgative in that case?

A.—I always like to give salts, oil is an equally good purgative, it is milder, and if I had to repeat my dose I would then turn to oil. I would not continue giving salts.

Q.—I have used with good results three pounds of hop yeast?

A.—I never tried hop yeast, there may be something in it. I am not in a position to give you any information along that line.

Q.—What dose of nux vomica do you give?

A.—A dram is enough for a cow or an ox. I would not advice a farmer to administer strychnine.

Q.—Do you place any value on injection?

A.—Yes, I always like an injection for impaction of manyplies. You never do any harm by giving an injection. I do not think a horned beast ever received an injury from an injection.

Q.—Is there any difference in the action of boiled linseed oil and raw linseed oil?

A.—Boiled linseed oil is not fit to be used as a purgative agent. Boiled linseed oil should not be used as a medicine.

Q.—Would not lard be better?

A.—Yes, I would prefer lard to boiled linseed oil but castor oil is all right.

Robert Miller, Stouffville: I like the way Dr. Reed explains things to us. I think he has gone to a great deal of trouble to put this matter in a form so that he could lay it before us so that we could understand it. It is up to us now to take a lesson from him, and make good use of the knowledge he has placed before us.

There are some simple remedies our friend here mentioned. One way, he said, in the case of bloat, there is no more simple remedy than a cup of coal oil, and you always have it, and that is an important feature, because it can be administered quickly. That is something that you ought to remember, for ordinary bloat you can scarcely beat it. I do not know anything that will act quicker.

Q.—Will baking soda be as good?

A.—Not half as good, the best thing to do is to prevent these things. Feed your cattle carefully, and in order to do that you must have good, healthy, clean feed. When you begin to harvest your hay, see that it is cut in proper time, cured properly, and housed properly. Then feed it carefully, and you will never have an injury to your cattle from that hay. Then be careful when you are harvesting your straw, and this is a far more important point than many of us think, because straw is fed to a greater extent to the cattle than hay and quite properly so. Even if you have both hay and straw give straw, it is more easily digested than hay, and it makes a nice part of the well balanced ration. Straw does not get the consideration and attention that it should, for it deserves just as much attention as does the hay. It is just as important to have your straw cut at the proper time as it is to have the hay cut properly. Our duty in this thing is to prepare our food and give it to the cattle in a good common sense way, and then they will not suffer from indigestion.

Q.—Do you recommend cutting straw?

A.—In some cases if you want to mix it, I would always like to have a certain amount of long straw or hay, but do not feed everything cut just because it is not natural. I think if you have a case of impaction of the stomach and you get a passage through, you will have in some cases the experience that they get apparently a passage through scouring a little bit and you think your animal is getting all right, but do not be deceived in that way; you want to follow it up with continued doses of oil. Give them something that will nourish them and gradually clean out that impacted stuff that is sure to exist there even if there is an apparent passage through that third stomach.

Q.—Do you take all food from them?

A.—Yes; as a general thing they do not want to eat; but I take good care they do not get anything.

CAUSE, PREVENTION, AND TREATMENT OF COMMON AILMENTS OF SHEEP.

By J. Hugo Reed, V.S., Professor of Veterinary Science, O.A.C., Guelph.

It is doubtless unnecessary to remind you of the fact that the treatment of sheep for disease is a somewhat delicate matter. While sheep may be said to have generally good constitutions, they do not yield to treatment so readily as other classes of farm stock, and besides that, greater care is necessary in the administration of medicine. There is no doubt whatever in my mind that a large percentage of fatality in sheep is due, not to the disease, but to the method of administering the medicine. In giving sheep medicine out of a bottle great care must be observed in order to prevent suffocation. Those who were here this morning heard something about that with regard to cattle. In sheep, even though the power of swallowing is perfect, greater care must be observed not to pour too large a quantity into the mouth before the animal has swallowed. In elevating the sheep's head in order that the mouth may be higher that the throat, we very soon fill up the box known as the pharynx, and some of the medicine passes down the wind pipe and causes death from suffocation, or mechanical bronchitis will result and be followed by pneumonia and death. Therefore, in administering medicine to sheep, you should be very careful to pour the medicine into the mouth in very small quantities at a time. After the animal has swallowed, let in a little more, but if it refuses to swallow do not allow more than half an ounce to enter the mouth until you make it swallow.

WORMS. We propose to speak about worms first; intestinal parasites. We could spend a great deal of time going into the life history of these worms, but I do not think it is necessary to do so. I think it would be wise to confine our remarks to these varieties that trouble sheep in this province, and these are tape worm, and round worm, and we might include grub in the head, although that is not really a worm.

TAPE WORMS. My experience with sheep has been that they suffer more from tape worm than any other kind of worm. There are different varieties of tape worm. In order that a sheep can have tape worm it is necessary that the egg of the worm should be swallowed, and when sheep are pasturing on swampy ground, probably on ground over which during the fall hounds chase rabbits or hunt hares, they are more likely to suffer from the tape worm than in the case of sheep pasturing on high ground, because the tape worm is very largely a parasite affecting dogs, and during the time dogs are passing over, sections of tape worm will be passed and these sections or eggs have wonderful vitality. They can stand the extremes of weather, and they live through the winter, and in the spring when the sheep are pasturing over these lands they take up this larva in the grass. We sometimes wonder how it is that young lambs will get tape worm, and I am not very sure myself how they get them; but the fact is that very young lambs that have not pastured on low lying ground are troubled with tape worm. And then the theory of the manner in which they become affected, probably would not be wise to discuss. During the period when the tape worm is small in size the health of the animal is not interfered with, but later on it does not thrive and may die.

The question is, how are we going to treat affected sheep? There are a great many methods of treatment. Probably the most modern and the most successful method is the administration of turpentine or gasoline, or benzine. I have had more experience with spirits of turpentine, although I believe benzine is highly recommended by some practitioners. In the first place the animal requires to be fasted. It should not have anything to eat for from twelve to eighteen hours, and the turpentine or benzine should be given in from two to four dram doses, according to the size of the animal. The medicine must be mixed with something, and sweet milk is considered best for this purpose, one part of turpentine to seven of milk. Some recommend diluting it even as much as one to fifteen. I prefer the stronger dose, because then we have the less quantity of fluid to administer to the animal. Each animal is given a dose of this mixture after having fasted from twelve to eighteen hours, and it is well to keep them from feeding for from two to three hours after that, and it is well to keep them confined for some hours after that in order that the parasite that has been destroyed will be passed in the yard, where they can be collected and burnt.

Another successful method of treating tape worm, which may appear rather unprofessional to some of you, is to use pumpkin seeds. The pumpkin seeds are broken and then boiled. Put them on the stove with a considerable quantity of water and allow them to simmer from five to six hours, and then the strength of the pumpkin seeds is supposed to have become mixed with the fluid, and each animal should get the product of from two to four ounces, according to its size. Whether treating with pumpkin seed or oil of turpentine, or benzine, it is well to repeat the treatment in from ten to twelve days. It is not probable that one treatment will be effective, a second treatment, and, indeed, sometimes four are necessary, but as a usual thing two treatments are all that are needed.

Round Worms. The life history of round worms is somewhat the same as that of tape worms, except that they do not come from dogs. The sheep receive the larva in water; seldom running water. The symptoms are somewhat the same as in tape worm. The treatment is practically the same, except I do not think the pumpkin seed would be effective in round worms.

There is another parasite which causes what is known as the nodular disease in sheep. I am not aware that we have it in this section, but we have some in the Dominion. It causes the presence of small nodules from the size of a pea up to the size of a bean on the coating of the intestines, and each one of these nodules will be found to contain a little worm somewhat hairlike. There is practically no treatment for this trouble. It does not interfere with the thriftiness of the animal until it reaches an advanced stage; then it causes irregular digestion, constipation, followed by diarrhoea, and the only way to get rid of it is to destroy the whole flock. Get fresh sheep and keep them off the pasture on which the other sheep had become affected.

Grub in the head can hardly be called a worm, but I think it causes more loss in sheep than any of the things I have already discussed. It is caused by the sheep bot fly or gad fly during the hot months in the summer, particularly during July and August, and the early part of September. It deposits its eggs upon or near the nostril of the sheep. Some claim it is alive when deposited, but I think that is an exaggerated idea. At all events it has the faculty of motion and it follows the mucous membrane up the nostril into the cavities of the skull. The sheep experience no inconvenience whatever until the next spring, when we notice the animal is dull and seeks solitude, does not want to mingle with the other sheep. The larva have developed during the months that has intervened into little grubs from about one half inch to nearly an inch in length. They cause an irritation in the sinus, which is expressed by snuffling and nasal discharge.

One treatment for this disease is fumigation, by burning sulphur. Put the sheep in a close apartment and close the windows and doors, and then burn sulphur until the building becomes so full of the fumes that the person who is operating cannot stand it any longer. He can judge as to what the sheep can stand pretty well by what he can stand himself, and when he can no longer withstand the fumes, then open the doors and windows and allow the admission of air. The treatment is supposed to force the animal to inhale these fumes which enter the sinus and destroy the worm. They do not necessarily all escape, and I have held a post mortem upon sheep, and found a considerable number of worms dead, but they still continue to cause more or less irritation.

Another method is to make a mixture something like the tape worm mixture, one part of oil of turpentine to fifteen of milk. Get an assistant to hold the head up. Fill a syringe with this material and insert the nozzle as far down the nostril as possible and then very suddenly push the piston to force the liquid out of the syringe and that is supposed to force into the sinus some of this liquid. I find that most of it goes to the pharynx, and there is danger of it going to the larynx. As soon as you have operated the syringe allow the animal to get its head down and leave it down till it ceases coughing. Then set it up again and treat the other nostril. Benzine or gasoline might be used for the purpose, but turpentine is supposed to give the best results. Prevention is better than cure, and the best way to prevent is either by housing the sheep during the day in fly time, or keep their nostrils daubed with ordinary pine tar and keep the troughs or box that contains the salt painted with tar in order that the nostrils and the sheep may at all times during fly time have an odor of tar. This should be attended to at least twice a week. The flies will not interfere with any part that is covered with tar even to a small extent.

John Campbell, Woodville: Our chairman has laid a task on me in putting an amateur to follow a professional. It is like trying to beat Dr. Reed at his own game. In the first place I would like to say that one of the good things about this country is that we are so little troubled with worms. If we had the difficulties they have in Great Britain, there would be some reason for being so indifferent about sheep. We know practically little of worms in this country, and so far as my experience goes, tape worms is the only one from which our flocks suffer.

I never had occasion to suspect that we ever had a case of round worm on our farm. I take the precaution when sheep die to open them, and try to discover the cause of death, and have found very few cases of nodular disease. I have had some trouble with tape worm, and there is a remedy which I found very good. That was the use of oil of the male fern seed. I give a teaspoonful or two or more to a large sheep. When you use gasoline or turpentine I believe in the use of Epsom salts afterwards in order to create a strong action of the bowels, and so throw off what the previous medicine has killed or weakened to such condition that they lose their power. I have more faith in Epsom salts than in all other remedies put together.

Q.—How much salts do you give at a dose?

A.—Four ounces is the maximum; from two to four ounces, and after that I give the smaller dose again, and always like to add a little ginger.

Q.—How much pumpkin seed would you give?

A. A good large handful put in the water and allowed to boil. There is no danger of over-boiling the pumpkin seed. We generally put them in whole, and let them simmer for a long time. I believe it would be better to break them.

The Chairman: There was one point hinted at that I think is an important one, and that is where worms of any kind are troublesome in the flock it is important not to let the sheep on old pasture. If you put them on fresh fields the difficulty will decrease.

Mr. Campbell: That is where experience and theory differ. In municipalities where sheep are allowed to run on the roadside, they do better than if you enclose them in a field. The Hon. John Dryden was the first man that drew my attention to that. He said that where sheep were allowed to run on the roadside they did better than in fields.

Q.—How do you detect the presence of tape worm?

A.—By want of thrift and loss of skin color. I do not think tape worm is as scarce as many suppose. I am sure we often see them passing in small sections.

Prof. Day: I know of one flock of a certain farmer, and there were certain fields on that farm that you dare not let a flock of sheep in, for if you did, the lambs went to pieces immediately, and I also know that the sheep on that farm had considerable trouble with tape worm, and for the last seven or eight years they have been put in new pastures every year. They have had no other treatment, and I do not think you can find any tape worm to-day. It is not only a theory; it is a little experience I have had along this line.

Dr. Reed: When I commenced my duties at the College we had considerable loss from tape worm, and I started the pumpkin seed treatment; and while we may have sustained loss from tape worm since then, we have practically had no deaths. I arrived at the conclusion that these sheep received that tape worm from pasturing on certain grounds. I notified the farm manager to keep these sheep off these grounds in the spring, particularly; but it was not done, and the result was that year after year we had trouble. When Prof. Day got control of the farm department I asked him to keep them off certain plots and he did so, and with the change from field to field the result has been that we have had no trouble from tape worm.

Indigestion. The anatomy of a sheep or an ox is practically alike, except the difference in size. The stomach of the sheep resembles the stomach of an ox and is subject to the same diseases. The principal disease in sheep consists in the inflammation of the paunch or bloating; the latter occurs more frequently on rape. If a flock of sheep turned out on rape or on a turnip field, after there has been a little frost, some of them will bloat, and bloating sometimes kills sheep very quickly. It is not uncommon for a person to go out in a field and find one or more lying dead.

Where the symptoms are not serious or extreme, and where there is no danger of death taking place, endeavor to dissipate the cause by the administration of medicine, and here again turpentine comes in. We cannot name anything that acts as well as the oil of turpentine given with milk or raw linseed oil. To an ordinary sheep I would give at least three tablespoonsful. This will in the majority of cases, neutralize these gasses. If necessary we can repeat the dose in the course of an hour or two. If it be a case in which we cannot wait for the action of medicine then we must puncture the same as we would for an ox. Puncture on the left side between the point of the hip and the last rib. Puncture with a trocar if you have one or use a pocket knife. It is a good practice to follow with a purgative. To a large animal I would give six or eight ounces; there is little danger of causing super-purgation unless we give a very excessive dose. It is certainly good practice to give a little ginger mixed with the salts, probably two drams of ginger to a quarter of an ounce or a desert spoonful of Epsom salts. The idea being that it prevents griping.

Where we have the rumen or paunch filed with food the animal will be dull, the rumination ceases, and the appetite disappears, and the animal is uneasy. It is not so noticeable in a sheep as in other animals because the wool is so long that it hides it; manipulation will often relieve it. The treatment is a good purgative, and if purgation does not take place within twenty-four hours, follow it with four ounces of linseed oil, and repeat that about every twenty-four hours until active purgation ceases. It is a good practise to give a nerve stimulant, in the meantime, about fifteen to twenty grains of nux vomica, probably, to one-third of a teaspoonful, and repeat it three times a day as long as necessary.

Mr. John Campbell: I have used the trocar and cannula with good success, and I would have lost some sheep had we not used it. One we used it on won second place the next year at the International Show at Chicago. He was good enough to take second place against all that were shown at that show, and we sold him for $125. That shows the need we have of courage when we have no time to send for a veterinarian. We should have just a little bit of nerve, and use this instrument. We have it on hand always. That instrument should be on every farm wherever there is a sheep or a cow, and you can often save the life of a beast where you have no time to send three or five miles for a veterinarian.

Q.—How deep do you put that in?

A.—So that it will go just where the gas forms; I should say two inches for a sheep. I have used turpentine with good results and have also used common baking soda in cold water.

Dr. Reed: It has not as prompt action as turpentine.

Mr. Campbell: I think flax seed has a great deal of influence in loosening what is in the stomach making way for the purgative to take the proper effect. A veterinarian I had occasion to consult not long ago always recommended the use of raw linseed oil; but I have had a great deal of confidence in flax seed, not that it will do the work itself, but it is a preparation that enables the purgative to do its work a little better.

Q.—How long after giving the flax seed would you give the purgative?

A.—I should let the flax seed do its work for a few hours.

Mr. Glendenning: If we drench a cow with salts or raw oil what stomach does that drench go into, the first or the third?

A. It depends to some extent on the condition of the animal. In health, it is supposed to enter the third stomach because there is closure of what is called the œsophageal canal that runs from the opening of the gullet to the stomach and from the first stomach to the third. In the case of impaction of the rumen in either an ox or a sheep the first stomach is where we want it, because it will have the action of liquefying and causing the motion of the contents of that stomach and in the case of bloating, particularly, that is where we want it. We give turpentine to prevent formation of gas and to neutralize the gas already formed.

Q.—Is common soda of any use?

A.—Yes.

Q.—What is the difference between oil of turpentine and spirits of turpentine?

A.—Oil of turpentine is the correct name for what is usually called spirits of turpentine. They are the same thing.

SHEEP SCAB.

By J. Hugo Reed, V.S., Professor of Veterinary Science, O.A.C., Guelph.

Whether it is fortunate or unfortunate, I must admit that my personal experience with scab has been light, but I have seen a few cases. Ontario in general is not very much bothered with the scab, although there are some sections in which it exists.

It is a skin disease that is caused by a parasite. Some of the parasites work on the surface of the skin, and some burrow between the external and internal layers of the skin, and some burrow between the internal layer of the skin and the underlying tissue.

The treatment is the same in all cases. In order that an animal may develop scab it is necessary that it be subject to infection. It quickly multiplies, and the disease is slight or extensive according to the length of time the animal has been affected.

Scab causes itchiness. The animal rubs itself against fence corners and posts, and the wool pulls out in different places. If we remove the scale we can see the parasite.

Now, about the treatment. In the first place, isolate all infected animals; or, better still, remove from the affected quarters all animals not yet affected and watch them closely.

In the North-west, where they have a large number of animals, they have a dipping-tank that is constructed at considerable expense, and is heated by steam. The most effective dip mixture is said to be what is called the lime-sulphur dip—about ten pounds of unslaked lime and twenty-four pounds of sulphur to one hundred gallons of water. The lime ought to be slaked first, and the sulphur gradually mixed with water, gradually increasing the temperature of the mixture and keeping it stirred, then the whole mixture is put together and kept at a temperature of one hundred and five. All applications for scab or other skin diseases give best results when applied warm. The wool must be raked during the time the animal is in the dip in order that the dip will come in contact with the skin.

In this part of the country where the disease is not general, each animal is dipped separately, and the dip is composed of eight ounces of the oil of tar and two pounds of sulphur to a gallon of raw linseed oil; that makes a very good mixture. You must be very careful to get the affected parts of the sheep covered with this mixture. The parasite of the scab exists very largely under the scab or scales that are formed, and it is quite possible that during the first dipping or first application of ordinary sheep dip or the mixture I have mentioned, it may not come in contact with the parasite on account of some of these scabs not being removed; hence it is wise to repeat the treatment in ten days or two weeks and if necessary repeat again.

Q.—How much turpentine do you give a cow?

A.—I have given a pound in two hours; but I consider from two to four ounces enough to give under ordinary circumstances.

Q.—Will you tell us the safest way to drench a sheep?

A.—I do not know of any way of drenching a sheep with the exception of elevating its mouth and pouring the liquid out of a bottle in small quantities until it swallows. With a pig we put a piece of rubber tube on the end of a bottle and put that in the mouth and let him chew it, but a sheep won't act in that way.

The Chairman: I am sure you will acquiesce in what has been said. It is good, sound, common sense. There is no use going about the bush and saying this and that do not exist. Our business is to find out where they do exist, and I am glad indeed to hear a prominent sheep breeder having the courage to come out and face this question, and strike right from the shoulder with regard to it. Let us make sure that we have a clean bill before we get indignant when any person accuses us of not having it. I have been asked that Dr. Reed should describe the first symptoms of foot and mouth disease.

Dr. Reed: The first symptoms of foot and mouth disease generally go unperceived. It is an increase of temperature and the ordinary stock owner will not notice it; in fact, no person would notice it. The first visible thing is a daintiness in eating. If the mouth be examined small vesicles or blisters will be noticed. The animal slobbers, and the saliva will run from the mouth, at first in small quantities, and as the disease advances, in large quantities. The tongue becomes thickened and in some cases protrudes from the mouth. In the meantime the animal, on account of the irritation of the mouth, licks at things. There is generally more or less irritation of the feet and legs; the animal will lick the feet, and the virus, if not already existing in the foot, gets there from the animal's tongue and the foot becomes involved; not the hoof, because it is not susceptible to the disease, but the parts begin to swell, and they show these little vesicles the mouth becomes more lacerated, the ability to eat becomes less, and in some cases death takes place. Under treatment a large percentage of animals will recover.

MR. CAMPBELL: If there is a question that is important to sheep raisers in Ontario to-day, it is that of scab. I know men who are in this building, men who are before me, who have suffered the loss of hundreds of dollars, and in some cases thousands of dollars, from scab, and yet they have not a scabby sheep on their farm and never had. We see much in the papers of the action that our Canadian Government is taking regarding the foot and mouth disease, that is prevalent in the United States at the present time. The American Government saw fit in the middle of June last to impose quarantine restriction on Canadian sheep coming into the United States, with the result that it has completely demolished the whole pure-bred sheep business of Canada. It has done it to such an extent that there are no sheep going across from Canada to the States except a very few car loads. The high class trade is completly blocked, and the result is that men who were breeding for years, and now owning good flocks, have to let them go at what they can get. I am certain that tens of thousands of dollars will not cover the loss that the sheep breeders of Canada are suffering during the present year from scab, and why so? Because we have had scab in existence in the Province of Ontario for years, and it is one of the greatest evils that ever came into Canada, and one of the worst things to get rid of. You know perfectly well that long ago when many of us were school boys, if we would get the itch we would be ashamed of it, and would never own up to it, and our mothers would not either; and it is precisely the same with regard to scab in sheep. Some men who get it in their flocks, instead of being honest, open-hearted, and frank about it by reporting to the Government, will hide it if they can, and they will even lie about it. That is pretty strong language, but don't you forget that the success of the sheep breeders in the Dominion of Canada depends very largely upon the fact as to whether we will take active measures to get rid of this scab, and get back the good trade that we had with the other side. We have with us Dr. Rutherford's representative form Ottawa, and we know that Dr. Rutherford is doing all he can and the sheep breeders are doing all they can, but the fact remains that we have got it, and while the Canadian Government, with our strong approval is using every measure they can in order to keep the foot and mouth disease out of Canada, let us aim at getting a clean bill of health for our flocks. I tell you there are veterinarians through the country who are giving certificates for sheep they never saw, and there are car loads going through to Buffalo that have been inspected by Canadian Inspectors, and have been going in, infected with the scab. A man from New York State told me yesterday that he was in Buffalo not very long ago, and the claim was made that we had no scab in Ontario at present, but samples f wool were taken from a shipment into the Inspector's Office, and when examined under a microscope the scab was seen, and it is a fact that we have it in a few flocks.

People are apt to blame the American Government for the action they have taken, but I say, "Don't do it, friends." We should take hold of this matter, and punish everybody who does not report a case of scab. I was suspicious of having had scab on our place some sixteen or twenty years ago. We got it in the course of a trade with lambs. We took that bunch of lambs, sheared them right in the dead of winter, and put them into a warm cattle stable, then got at them with McDougall's dip, taking the precaution of breaking up the roughness of spots. When the weather got warm and the flock was put back to sheep pens, no further trace of the disease was ever seen.

GROWING AND HANDLING WOOL.

By T. D. Wardlaw, Toronto.

I have been termed a "wool expert." In a certain way that is somewhat misleading. The ordinary acceptance of the term would lead you to believe that I could go into the minute details of the growth of wool, construction of the staple, etc., instead of which my experience has been along the practical lines of buying, grading, and manufacturing. We can safely leave the expert work to the professor and the chemist. What we want to get at is the best way to bring our wool growers and wool users together, and see what can be done to save one, if not two, industries. If I can assist in that laudable work I shall feel deeply grateful.

We are facing a problem requiring very careful consideration. We had 700,000 more sheep in Ontario in 1882 than in 1907. In all the Dominion we have almost the same number of sheep as in 1882. Ontario had in 1882, 1,900,000; 1894, 1,950,000; 1907, 1,200,000. We imported $21,400,000 of woollen goods last year; every dollar's worth of it could be made in Canada.

Is it because keeping sheep does not pay? Are we raising the wrong kind of sheep? Are we losing the wool trade from the condition in which we bring the wool to the market? Are the manufacturers able to buy wools from foreign sources more uniform in quality, in better condition, and better suited to their particular needs, than they can from Canadian growers? As to whether it pays or not to keep sheep, I may not be an authority, but in Great Britain you find on the highly cultivated farms, where rents, taxes and other expenses are higher than here, sheep are kept at a profit. It is the custom there to keep a few sheep in the pasture fields with the horses and cattle to keep down pernicious weeds. That might be done here to advantage, as a good ewe will keep down more weeds that the hired man, and will pay with her wool for her keep, while the lambs are clear profit. There is a great outcry over noxious weeds; try the sheep cure.

Great Britain grows 100,000,000 lbs. and exports 31,000,000 lbs. of wool annually.

Are we raising the right kind of sheep for mutton and wool? I cannot speak of the former, but of the latter I most emphatically say there is great room for improvement. The constant changing fashions seriously affect the wool market, but there are standard wools for which there is always a good demand. It has always surprised me to see how faithfully some farmers persist in keeping such breeds as Lincoln and Cotswold, when the manufacturers do not desire that class of wool, except for low grade carpet warp; while Leicesters and Downs, and their crosses and the crosses of Merino and Leicester, are always wanted. You may say that wool is wool, and when I take my wool to the country merchant I get the market price, and the coarse grades give a heavier yield, and therefore bring better returns. I am sorry to say there is too much truth in this. The farmer is probably a good customer to the merchant, and the latter, not willing to offend, pays the price he has no right to pay; but depend upon it he gets even before the year is out. He must, or go out of business. This is the most discouraging to the farmer who prides himself on his fine quality of wool, as he gets no more than his neighbor obtains for his coarse, ill kept, ill tied up, and badly conditioned wool.

The condition of the wool when marketed is a most important consideration. Years ago when I bought wool in Galt market I knew the farmers whose wool could be depended upon, and those whose every fleece required examination. As I bought for our own factory, great care was taken in receiving these wools, and we willingly gave more for the choice lots and were glad to get them. The abuse we got for discriminating was rather strong at times, but what with half washed fleeces, cotts, second growth, burrs, shives, tag locks, feathers, straw and dirt of almost every kind and description, we had to draw the line. In one case a fine waggon load came in of beautifully tied up fleeces, a nice clean sheet covering them. On weighing a few they seemed to average very heavy; by close inspection I found that about a dipper of water had been carefully poured in the centre of every fleece. Another trouble was over cotts, some of them "Hardheads." Little was said of an allowance on these, but on the soft cotts there were frequently a dispute, more particularly when the farmer has wasted time in straining that cott to make it appear as if it were a free, open fleece, vainly believing this made it perfect.

Then came the burry and shivey fleeces, and wool in this condition is dreaded by all manufacturers and should be docked very sharply. I will show you specimens in a short time. There is no excuse for wools being marketed in this condition. Burdocks can easily be cut down before the burrs form, and the sheep should not have the run of the straw stack nor be housed in a building which is not absolutely clean, well ventilated, and with a tight ceiling to prevent dirt falling on the sheep.

I feel that there should be some energetic effort made by our Agricultural Colleges, Farmers' Institutes, and Sheep Breeders' Associations, to educate the wool grower as to the condition in which his wool should be marketed. As to the method of marketing wool I would like to see some better means adopted which would be as satisfactory to the farmer as to the manufacturer. Years ago, small carding factories were dotted all over the country, and the farmers took their wool there to be made into rolls, yarn, or full cloth; and, by way of digression, let me say that no better wearing goods were ever manufactured than the goods thus made. Yarn spun from the rolls at home was not strained in the spinning, nor on the knitting needles when it was knitted into socks and mitts. When the farmer and the small manufacturer came together they met as friends, and were sympathetic with each other, appreciating each others' difficulties; the manufacturer would point out any faults in the condition of the wool and the farmer saw it was to his own interest to accept and act on the advice. But now, with the closing up of the mills through the buying of ready-made clothing, cloth, and hosiery, and from tariff changes, there has crept in a feeling of carelessness or indifference to the needs of each other, and the condition of the wool as marketed has visibly deteriorated. It is therefore necessary to bring these men together, and it seems to me that one method would be to have our large manufacturers invite, say semi-annually, a certain number of wool growers to visit their factories, so that every process, from the wool in the fleece to the finished fabric could be seen and carefully noted. Then let an open meeting be held in the warehouse of the factory, where questions could be asked and answered, which would be of tremendous practical benefit to all concerned.

It has been suggested that there should be a central receiving and grading warehouse in every township or county under the wool growers' control, to which all wools should be sent, there to be carefully graded into as many grades as the trade demanded, and there would be more grades than you may have any idea of. There would be the main division of clothing and combing wools. These again subdivided into fine, medium and coarse. These again into hogget, wether, ewe, and ram, with other grades for cotts, burry, brashy, unwashed, etc. Then, at a specified time, let the wools be sold at public auction to manufacturers or dealers, when the competition would result in money value being obtained. This scheme may sound visionary; and, perhaps, with small scattered flocks as at present, it may not be practicable; but I hope the day is coming when Canada will take its place as the leading wool country in the world for such wools as it is best suited to grow. We can, in the Province of Ontario, Southern Quebec, Nova Scotia, New Brunswick and Prince Edward Island grow the soundest, stapled wools to be had. Our Leicester has a lustre and strength superior to the wool from the same breed from farther south. This wool is in great demand in the United States; it was the foundation of the worsted industry there. It was in greater demand in Canada until the tariff permitted worsted yarn to come in at low rates for manufacturing purposes. Since then it is customary in some mills to import top and simply draw and spin the yarn instead of carding and combing, so that we have mills to-day without the necessary machinery to enable them to make yarn from the fleece. This should not be. The wools grown in Canada should, so far as possible, be manufactured in Canada, and I want to tell you that the Canadian woolen and worsted mills can, and do make as good cloth as our imported. I have samples here from several of our leading mills as an object lesson, and you will readily agree with my assertion. It is a crying shame and disgrace for our merchants to use as a crowning argument in effecting a sale, "This is an imported article." I went into a clothing store in Toronto a few weeks ago to look at overcoats. I was shown one at $19, and asked what mill in Canada made the cloth. The answer I got was, "We handle only imported cloth." It was Canadian made. My reply was that I would not buy imported if I could get equally good in Canadian. I sent to a Canadian mill, got the cloth, and had this overcoat made for less than the readymade, and it is well worth $10 more. My object in wishing to know the mill from which the cloth of the readymade stock came was so that I should know whether the cloth would stand exposure. The majority of our manufacturers use the very highest grade of dyes in coloring their goods, and their dyings will stand equally well with the much vaunted imported, and much better than a great deal of the same. Get the idea out of your heads that has been hammered in by the ignorant or unscrupulous, that we do not make as good or fast colors as the imported. It is quite true that we have manufacturers who think it economy to use the lower grade of dyes; but they are in a minority, and they would be forced to quit the habit entirely if public opinion demanded it; but so long as you want a suit of clothes for $6.99, you must not expect too much, and you must know that low-priced shoddy goods are the dearest you can buy.

IMPORTED GOODS. One of our leading manufacturers told me last week of going into a merchant tailor shop in his own town where he was shown the very latest things in imported tweeds, just received. "Why couldn't Canadian mills make goods like these?" Out of the twenty pieces on exhibition, thirteen of them were my good friend's own make, and he could not say anything for fear the merchant would row with the wholesale firm from whom he bought, and they in turn would cut out the manufacturer. This is much more prevalent than you are aware of, and it seems to me the Canadian manufacturers should stamp their names on the back of every piece of fabric they make, on which it could be placed without affecting the material. I may say I am pleased to know that some of our manufacturers are doing this; and you should first ask for stamped Canadian goods, as you may be sure a manufacturer will not brand an article he cannot recommend. In this way you assist the Canadian manufacturer, and by assisting him you assist yourself. You create a better local demand for your wools, you get goods that you can depend upon as being absolutely reliable. There is another method by which a lot of low trashy goods could be—to a certain extent—kept out of Canada; or, if they did come in, they would have to compete more fairly with goods of better quality, and undervaluation would become much more difficult, if not impossible. This method may run counter to the ideas of many, and it would require careful adjustment, so that while benefitting the majority it must not hurt the minority.

Now I am going to skate on thin ice for a few minutes. I believe a duty on wools such as are grown in Canada of 3c. per lb. on greasy, 6c. per lb. on washed, 9c. per lb. on scoured, would prove of great benefit to the wool growers, while a specific duty of 12c. per lb. on manufactured goods would be of equal benefit to the manufacturer. This, as I have said, would hit the imported low grade goods good and hard, and they deserve it; but what effect would it have on Canadian made goods? Presuming the customer had to pay the full addition of 12c. per lb., what would that amount to on a suit of clothes? It takes seven yards to make a suit. Summer weights run from 8 to 10 ounces per yard, winter weights from 10 to 14 ounces per yard. Take the extreme in both cases, namely; summer weight at 10 ounces per yard, 7 yards—4 lbs, 6 ounces, at 12 cents, equals 52½ cents, the additional cost of a suit of clothes; while for winter weight at 14 ounces per pard, for 7 yards—6 lbs. 2 ounces, at 12 cents, equals 73½ cents per suit of clothes. These are not serious amounts if you had to pay them, but you do not have to pay them. This at first thought may seem strange, but not so when made clear to you. The fixed expenses of a factory such as interest on investments, depreciation on plant, insurance, taxes, office, travelling, and many other items, are practically the same whether the factory is running 50 per cent. of its capacity or to its full capacity. From this you can readily see that the cost of manufacturing would be tremendously reduced if the latter condition existed. In addition to this, if the Canadian manufacturer had a larger share of the home market, he would not be compelled to make single pieces, or five or ten pieces of a pattern, but could get a good run of say one or two hundred pieces. You can see how this would lower the cost of manufacturing, One manufacturer estimates it at 15 per cent. You may say this is all very well for the manufacturer, but where does the customer come in? In the woollen business, on account of the great diversity of goods made, there is little possibility of a manufacturing trust to uphold prices. For should such be attempted there would be such a rush for practical manufacturers to get into the business that the home competition would keep prices down to a fair living margin, and you would reap the benefit of it by getting better goods at the lowest market value. Some people have the idea that if the public want such shoddy goods as are made by the experts of Britain and Europe, "Let us make such goods for them." That is easier said than done. We would be up against the most expert shoddy manufacturers in the world. Some men boast that, "Given any fibre with two ends they can make it into yarn." Why, they actually use a cotton thread for a core and cover it with "flocks," that is the shearings off the face of the cloth. This yarn is used for a filling or a backing for the most presentable fabrics. Probably the facing is fine worsted, and the suit of clothes made from this cloth looks fit for anybody; but it is a delusion and a snare. You soon find your elbows and knees breaking through, as there is little wear in the thin facing, and there is none in the rubbishy backing. I will not dwell longer on this phase of the question. You may say this digression is irrelevant to the subject upon which I was to address you. If so, it is so closely allied to it that it may be almost considered as an integral part.

In worsted mills the Leicester wool is much in demand for hosiery yarn, particularly for boys' and girls' hose. It is used for the sweater and jacket trade, and when crossed to say a quarter, three-eighths, or one-half blood Merino, it is eminently fitted for the medium grades of hose and half hose, fingering, and knitting yarns. The much used Shetland floss is made from this, or from a blend of it and the longer stapled Downs, also a great deal of our worsted cloth of which I have samples; while in the woollen mills it is used for mackinaws, blankets, etc. The blanket made of these wools is light and lofty, a 7 lb. blanket being more bulky than a 10 lb. one made of Cotswold or Lincoln. Of the Down wools, any of them are well suited for our mills. I think it would be well to have more Dorset Horn sheep, so long as we are afflicted with the curse of so many dogs. They are practically dog-proof, are very prolific, and the lamb wool, that is the shorn lamb, is one of the best wools obtainable for underwear as it is of fine quality, has a beautiful silky lustre and excellent wearing properties. This breed should be kept in dog infested districts, as they will fight a dog without hesitation, their horns being used to good effect.

In reference to the various Down sheep, care should be taken in keeping the flock free from sheep yielding brashy and kempy wool. Do not be afraid to make mutton of them. The brashy wool is of a dry, harsh nature, and works up rough in manufacturing, while the kemp in the wool being dead staple, breaks up in the manufacturing, much of it drops as waste, and what remains is a detriment, as it does not take the color in dyeing.

Cotted fleeces, as I mentioned before, are a source of trouble. Carelessness is the great cause of this. Letting sheep stop under the drip of a roof until the suint is literally washed out of the wool, leaves the wool in condition to readily felt, and wool always felts at the bottom of the staple first. With the suint, or natural oil, in the fleece there is little danger of cotting. Should the natural supply of oil be cut off from sickness, a cotted fleece may result. Sheep should never be kept in a cold building in which they are liable to be overheated and sweat. All the wool from the far West, that is, from districts where the sheep are protected in warm sheds, are fitted for woolen but are used for worsted mills, as the change in temperature from below zero to sweltering heat, cause the sheep to sweat, and thus, respectively, retard and accelerate the growth of the staple to such an extent that by careful examination of the staples you can form a good idea of how many times they have been overheated. The wool is so attenuated and weakened by the sweating periods that the staple breaks at these places, and thus becomes useless for combing, but it can be advantageously used in a woolen mill. This emphasizes the necessity of keeping the sheep in well-ventilated buildings. Second-growth wool is easily obviated by shearing the sheep at the right time.

Cotts and second-growth wools are very wasteful in mills, more particularly in worsted mills, as all the felted bottom of the cotted fleece goes into noil, as does all the second-growth wool. As noil, it is of much lower value than as top. When burry and shivey wools are combed, the burrs and shives go into the waste dropped below the carding machine, or into the noils, and the only way to remove them is by carbonizing. This is done by soaking in sulphuric acid and water for say one-half hour, then extract and dry at a temperature of 200 degrees Fahrenheit until the vegetable matter becomes black. It is then put through a duster to remove the dry burnt matter, then soaked in soda and water to neutralize the acid, and then rinsed in water to remove the soda. From this you will see the trouble burrs and shives cause the manufacturer.

Noils made from Canada wool are worth, say, 15 cents per lb. when free of burrs and shives. One of our Canadian manufacturers, finding himself over stocked with burry noils, sent a fair sample to the English market. The best offer he could get was 5 cents per lb. delivered. Noils from British-grown wools are free of these disagreeable, wasteful substances, and can be profitably handled by the manufacturer.

Noils are good, sound wool, although a shore staple, as the foregoing operations in no way injure the staple, as you can see by these samples here. They are well suited for woollen mills and help to give body to many fabrics; but if seedy and burry they must be carbonized, and this, as has been explained, adds to their cost, and does not improve the staple, either in quality or color. Can you wonder manufacturers insist on getting clean wools?

The manufacturer can buy imported wools free of these faults and very evenly graded for his particular requirements. When buying home-grown wool from the farmer he gets quite a large percentage of wools totally unfitted for his purpose, and either disposes of such as is unfitted or works it up at a disadvantage. From this it will be easy for you to see the advisability of keeping certain definite breeds or crosses of sheep, and keeping them clean, so that the wools will be of as near a uniform quality as possible, and thus be perfectly acceptable to the manufacturer and yield you the highest market price. You cannot expect the top price for mixed and ill-conditioned wools.

In the Argentine Republic the wool industry has developed to a most extraordinary degree in cross-breds, Merino and Leicester, and Merino and Lincoln are the leading crosses. These wools are so accurately graded in the unwashed state that manufacturers can order qualities from Nos. 1 to 6 and depend on their uniformity. This, to a manufacturer, is a most important consideration, and it behoves our Agricultural Colleges and Farmers' Institutes to see that the growers are thoroughly imbued with the necessary knowledge to have their wool graded in a similar manner.

Then comes the question of washed or unwashed wools. So long as the demand from the States exists, and you depend on it, so long must you wash the wool on the sheep's back, as the duty of 12 cents per lb. is the same on Canada-grown combing wool whether washed or unwashed. Personally, I believe in not washing the sheep. It exposes the sheep to sometimes very inclement weather and seriously affects their general health. This applies more particularly to the ewes. The washing of sheep is sometimes a most uncomfortable job. I found it so, when, as a lad of fifteen, the farmer, with a gentle twinkle in his eye, gave me old "Billy," the ram, to wash. It has been a moot question ever since whether I washed Billy or Billy washed me. I do know that it required a visit to a near by thorn tree to make me presentable on the way back to the farm.

After the sheep are washed they should be kept in a clean pasture field for not more than four days. If longer than that the natural oil begins to work its way up the staple and very soon the fleece can be classed as unwashed. When ready to shear, have your shearing pen or floor made perfectly clean; sweep it out. As each sheep is shorn spread the fleece out flat on the floor, tips up. Remove all adhering tags of foreign matter, and if there is any very coarse, hairy britch take it off, throwing all such skirtings in a separate pile. Then fold the fleece, tips in, roll from both ends, tie with smooth cotton twine, and put in a clean place. Use the broom, and bring in another sheep. Should any of these be burry or cotted put in a separate pile, tie up in separate sheets, or pack in separate bales. Then when you go to the market you can demand and obtain the highest market price. If you are not satisfied with the local buyer, then you had better—if your clip is large enough—make a permanent arrangement with some manufacturer or dealer in whom you can trust, and ship him the wool. He in turn will treat you right, as he wants good, well-cared for wool, and is only too glad to get it. Obtain his confidence, and you may be sure he will give you the very best figures the market warrants, so that he may get your next clip.

I have known farmers come to the factory during the wools season and ask the price of wool. This was told them in good faith. In a few days the wool came, unwashed, and great indignation was expressed when they did not get the price quoted. They knew well that the price was on washed wool, and tried to reap an advantage by a contemptible trick. Such tactics should be severely condemned, and, were a Wool Growers' Association is in existence, such dealings should be reported to, and dealt with by them.

When a manufacturer is fitted with proper facilities for scouring wool, I think it much better he should have it unwashed, as the fleece is less broken, and the nature and good qualities of the wool are better preserved; but whether washed or unwashed, the farmer who wants the confidence and esteem of the manufacturer should see that each fleece is free from taglocks and any foreign adhering matter. Never use sisal or any kind of binding twine, as so often it breaks in the wool and acts like burrs or shives. Do not coil the end of the fleece to bind it. The sorter in the mill cannot afford the time to uncoil this. He requires the fleece so that when he removes the string he can throw the open fleece on the table and quickly separate it into the various grades or sorts to which it belongs, taking the head, belly, legs and birtch from the main body of the fleece. To do this correctly and quickly requires a man of thorough training, and it is on him rests the responsibility of the uniformity of quality in the many varieties used in the mill. It is important he should receive the wool in as good condition as possible, as he must handle a lot in a day, and he must handle it expeditiously.

Some farmers tub wash their wool. This is most unwise when they want to sell the wool. It was all right when they had rolls made, but to a manufacturer it is only worth the price of the lowest quality or sort in it, as it is too slow a process to hand sort it in this condition, and it must be thrown into the lowest grade represented in it.

If farmers had the proper facilities for washing their sheep, they could do much better than wash them in the river. A large tank, say 3 feet deep, with 2½ feet of water in it, and sufficiently wide to let three or four sheep be handled at once, is infinitely better, as the free potash from the first few sheep would so change the water that it would act as a detergent or scouring agent, and succeeding sheep would be more easily washed and have much whiter wool.

It would be necessary to have a supply and over-flow pipe to regulate the depth of water.

What I have written here is more like a quiet talk with you than a carefully and logically prepared article. Were I to sit down with a few of you in a quiet corner, I could talk wool and manufacturing by the hour, tell you of the various wools in foreign countries, and the purposes to which many of them are specially adapted. Why a wool for clothing is unsuited for certain carpets, why Canada wools are not fitted for felt boots, why a wool from Persia is. How Australian and New Zealand long stapled fine wools are manufactured on the Bradford system of worsted, while the shorter staples are made up in the Belgian and drv spun system, with the particular uses to which each are put. But that would be outside of the object of the meeting. Capital will not easily invest in the woollen industry for two reasons, lack of interest by our wool growers, and lack of knowledge or indifference of our legislators.

Lieut.-Col. D. McCrae, Guelph: This wool question is a very difficult one to deal with. It is almost impossible for the Canadian farmer to keep his wool as clean and clear as the English farmer, as the English flocks are always on the grass and never housefed.

The last speaker is advocating a duty on wools and a corresponding duty on woollen goods, which he says would put things right. I am not sure that such would be the case. He says about 3 cents a pound duty on unwashed wool and 6 cents a pound on washed. I do not think that would make any great difference to the breeders. We had a fair price for wool two years ago, and we had a very unfair price for wool this year. The best price I got was 8 cents a pound, and how many days hard work can we afford to put in looking after our wool and sell it for 8 cents a pound?

The buyer frankly admitted that it was less than the value in the markets of the world, but, he said, we have all got loaded up with high priced wool from England, and we have got to do something to try and even up; we are therefore paying a very small price for wool this year. How are we going to benefit by putting on a duty of 3 cents a pound? I wonder if anybody can tell me how much duty was collected last year? $6. And how many pounds imported? Eight million pounds. Of course a great portion of that should come under the duty rate, probably about six and a half million pounds, and only $6 collected. The manufacturers are certainly getting the benefit of free wool along that line. A number of the sheep breeders I know are strongly in favor of the Government putting a duty on wool, and I suppose the least they would ask for is 10 cents a pound. I wonder if the manufacturers would be willing to put 10 cents a pound on wool and 10 cents a pound on the imported goods. We have little scoured wool in Canada, and scoured wool could be imported. Would Mr. Wardlaw be willing to put 10 cents a pound on each kind of wool? That is what some sheep breeders are advocating. There is a duty on wool now; it is not enforced and the manufacturers are getting the benefit of free wool. I would like to have it explained, how six millions and a half pounds of wool is imported and only $6 collected. How is it that the manufacturers get such a big haul out of it?

A Member: The Government know the manufacturers could not exist if they collected the duty on wool.

Col. McCrae: To whose hurt is that?

A Member: Probably to the Canadian sheep growers in the beginning; but you must consider what the Canadian sheep growers can continue to grow for many years ahead, and if he had the mills in Canada, he might grow all the wool he possibly could and still be protected for all he could produce. If twenty-one millions of dollars' worth of wool was imported, then twenty-one million dollars' worth of wool would have to be grown here, and the bulk would be grown here, because, the Canadian manufacturers prefer Canadian wools.

Col McCrae: There are a number of wool manufacturers in Canada. It is a prominent industry in Canada. The gentleman who has just spoken knows very well that manufacturers of this Province use very little Canadian wool.

A MEMBER: Certainly. They cannot, on account of the class of goods that are made. For blankets, or coarse goods, Canadian wool is splendid, but in the knitting (with the exception of a few lines) Canadian wools cannot be used nor can they be used on fine hosiery or cashmere.

MR. WARDLAW: We have to import for the fine grades, the Australian or New Zealand wools. You take the cross bred Leicester or the Merino and you cannot get any better wool in the world.

A MEMBER: But the manufacturers cannot get enough of it?

MR. WARDLAW: That is up to the wool growers.

COL. MCCRAE: The manufacturers are getting in free their half manufactured tops from fine wool, however, and they have the best of it.

A MEMBER: And the farmer has to suffer?

MR. GLENDENNING: They generally state that a duty of 3 cents a pound would raise the price of goods to 11 cents. Is that so?

MR. WARDLAW: I think 6 cents and 9 cents on scoured.

MR. GLENDENNING: Would the farmer get that extra?

MR. WARDLAW: Yes.

MR. GLENDENNING: In what way would the consumer not have to pay it?

MR. WARDLAW: You can count the mills on the fingers of one hand to-day; mills are shutting down. We have had the hardest fight in the world to get on in Canada. Put a duty on the woollen goods and let them run to their full capacity.

MR. GLENDENNING: The fellow who wears fine clothes, gets his goods cheaper than the one that wears coarse goods.

MR. WARDLAW: No; the man who wears fine clothes would have to pay for them. You would make all your goods in Canada; the home competition would keep the price down.

COL. MCCRAE: I have been told the Northwest wools were all sold, and now I understand they are still on hand?

MR. WARDLAW: Advances were made on that 1906 wool, and they could not cover themselves on it.

COL. MCCRAE: The wool has not been used?

MR. WARDLAW: I know that the Northwest wool is being used, and I can specify the mills.

A MEMBER: Will you explain the difference between Northwest wool and Ontario wools?

COL. MCCRAE: Mr. Wardlaw explained it by showing that the Northwest wool is not suitable for worsted purposes.

MR. WARDLAW: That is only in the districts where they are subject to Chinook winds.

MR. GLENDENNING: How are these North-west sheep bred?

A MEMBER: There are a good many cross-bred, either from the Montana or the Mexican ewes.

MR. ANDREWS: If all the worsted wools were manufactured in Canada, would not that accomplish the result, and the duty now paid on wools going into the United States would be saved. I would like to read a letter written by a sheep breeder from the North-west, and the reply I gave to him; they are both published in the trade paper. I pointed out many reasons why I consider a duty is not required, and that will give the farmers an opportunity to make sheep breeding possible. The fact of the matter is, that at the present time the woollen mills are in a condition which does not allow them to use the wool, and a large number of them are standing idle. One of the biggest woollen mills in Canada, at Hespeler, is standing idle, and all over Canada you have others lying idle, and many of our best woollen mills are being turned into knitting mills. If you had woollen mills here that would use Canadian wool it would be a benefit. But on many lines Canadian wool cannot be used to a great advantage, and I would like anybody to point out to me, why a duty would be required on wools, if the proper duty was put on woollen goods.

Q.—How would that duty effect the price of goods?

A.—The probability is the consumer would be required to pay extra 10 or 15 cents a yard. Canadian cloth is now sold so much less than English cloth that the probability is he would not suffer at all. At the present time the Canadian people are prejudiced against Canadian goods and in favor of English.

Mr. Biggar: That question is a very natural one, and the answer to it will make clear to you how illogical our woollen tariff is, and how impossible it will be to develop a really native woollen industry until the whole question is reviewed in the light of modern conditions. Pure wool goes into two classes of fabrics, yarns and cloth produced on the carding machine, and those produced by the combing process from which we derive our worsted yarns and cloths. The wools of Ontario are specially adapted for worsted goods, and the demand for worsted goods is far greater than that for carded wool goods. For example, the mills of the United States consume 157,000,000 pounds of raw wools in the woollen branch, and 261,000,000 pounds in the worsted branch, while the worsted industry of England is even larger in comparison with the wool industry. In Canada we have about 200 woollen mills of all kinds. Many of these are, of course, small mills operating only one or two sets of cards, but out of this total only three are worsted mills. Now if you remember that the United States worsted industry—which has attained such huge dimensions, far outclassing the woollen industry—was built upon Canadian wool, and that for many years practically all the wool used in that industry was imported from this country, and especially from Ontario, you will wonder the worsted business is not carried on here. Col. McCrae has pointed out that although the tariff provides for a duty on wool of a class grown in Canada it is not in force. Only six dollars in duty was collected last year and none this year. But that is not the worst of it. Tops and noils come in free, some kinds of yarns also come in free, and even in worsted yarns when imported for knitting purposes the duty is only 12½ per cent. Now, tops and noils are the first product of the worsted comb, and every pound of such material, which is wool only in the initial stages of manufacture, displaced a pound of Canadian wool. Thus you have the worsted industry strangled in its very beginning by conditions worse than under absolute free trade, because any mill in this branch would have to pay the high wages incidental to protect industries in general, and yet would have to compete with free imports from a country where this industry is specialized to a science. What woollen manufacturer will establish a worsted plant when he can import free of duty the class of tops, noils, and partially spun yarns exactly suited to his requirements? Thus it comes about that several million pounds of these materials, displacing Canadian wool, are brought in every year, while the wool of Ontario, particularly adapted to the worsted trade, has to be shipped to the United States, where it is made up into some of the finest worsted goods in the world. And do not forget that every pound of wool so shipped has to be sold in the United States market under a disadvantage to the Ontario sheep raiser; for owing to the United States duty on raw wool the Canadian exporter must necessarily get from 12 to 15 cents per pound less than the same wool realizes to the American farmer. I was formerly of the opinion that wool should be free, but a study of the history of the United States woollen tariff convinces me that, if protection is to be applied to a country at all it should be equitably applied. If protection is good for the manufacturer it is also good for the wool grower, and if the woollen industry of Canada is to be a native one in reality, as it was in former days, the protection must begin with the man who raises the sheep. If a duty is put on in favor of the Canadian wool and the tariff raised on manufactured goods to correspond, and to include the worsted trade, which is now the most important branch, the farmer would get a better price for his wool, and a stable industry employing millions of dollars of fresh capital would be built up, with all its benefits to the farmer, merchants and employees, while the general consumer would get a better class of goods at a less price than now, owing to the greater home production.

OUTLOOK FOR THE SWINE INDUSTRY IN ONTARIO.

By G. E. Day, Professor of Animal Husbandry, O.A.C., Guelph.

In the year 1900, according to figures which appear to be reliable, Canada shipped to the various ports of Great Britain the product of 1,169,976 hogs. Ireland sent the product of 410,500 hogs; and Denmark the product of 1,087,000 hogs. In 1907, Canada shipped the product of 803,940 hogs; Ireland, the product of 482,656 hogs; and Denmark the product of 1,767,970 hogs. These few figures bring out the startling fact than in 1907, as compared with 1900, the Irish product increased 17 per cent; the Danish increased 62 per cent; but the Canadian product *decreased* 31 per cent. Figures for 1908 are not available, but the indications are that 1908 will make a worse showing than 1907.

If our trade with Great Britain in bacon is not a profitable one, and if the Canadian farmer can use the product of his farm to better advantage than he can in finishing bacon hogs, then this falling off in the export of Canadian bacon may be regarded as a matter for congratulation rather than one to be deplored, but the thoughtful person may be pardoned if he views with some alarm such a marked falling off in a very important industry. The gravity of the situation, and the importance of the industry, may render it not unprofitable to examine our present position more in detail, and, as far as possible, to free our minds from all prejudice while doing so. No doubt there are many causes for the present position of affairs, but we shall confine ourselves to a consideration of some of the principal ones, as follows:

1. *The Financial Disturbance of 1907.* While it is true that the late financial troubles belonged primarily to the United States, it is also true that they had a widespread influence in unsettling the markets of the world, and the bacon trade suffered along with others. It is not necessary to more than mention this factor.

2. *The High Price of Grain and other Produce used in Feeding Hogs.* When the price of grain is high, the farmer is tempted to sell his grain rather than feed it to stock. It is remarkable, however, that the price of feed in Denmark is higher than it is here, and the Danish hog feeder has to buy by far the greater part of feed for his hogs, whereas, the Canadian farmer grows nearly all his own feed. In this matter, the Canadian has an immense advantage over the Dane, and can produce hogs at a much lower

cost; yet the Dane has increased his output, and threatens to drive the Canadian out of the market. It was the matter of high cost of production which led me, in 1904, after a brief visit to Denmark, to conclude that the Dane had probably nearly reached his limit in bacon production. A farmer who could materially increase his output by buying high priced imported feed was an unthought of possibility to me, but I now take off my hat to the Danish farmer and apologize for underestimating his ability.

3. *Distrust of the Packer on the part of the Farmer.* This is the most regrettable feature of the case, and one of the most difficult to handle. It is necessary, however, to touch upon it; because, if we can believe what has appeared in the press, this factor has played an important part in curtailing the output of hogs. That we shall ever have a mutually satisfactory understanding between packers and farmers is scarcely to be hoped for. The whole question is a difficult one to approach from any standpoint, and the man who attempts to pour oil upon the troubled waters is apt to find that the oil becomes explosive as soon as used, and he is liable to damage. It has been suggested quite frequently that packers should pay a uniform price for hogs throughout the year, but the futility of such a proposition can be easily appreciated when we take into consideration that all products and substances which have a market value are subject to fluctuations in value. Even gold and silver are not exempt from this law, and it is beyond the power of man to prevent fluctuation in the price of a marketable commodity. Therefore, so long as hogs are fed for market, so long will there be variations in their market price. Until some more practicable scheme for bridging the gulf between farmer and packer is evolved, the matter may well be left in abeyance.

Let us now turn our attention to some of the things which have made for the success of the bacon industry in Denmark, for they are well worthy of consideration. Following are some of these factors:

1. Denmark has escaped much of this disastrous friction between farmer and packer through her co-operative packing houses, in the establishment of which she has had a much happier experience than we have had in this country. Private enterprise in the packing business is not by any means unknown in Denmark, but there are enough strong co-operative concerns to establish the farmer's confidence in the business. The co-operative principle has also practically elimated the necessity for the middleman.

2. The country is small and the factories numerous, so that long railway hauls are unnecessary. The Dane is also near the British market, and all these things tend to keep down the expense account.

3. To create and hold a market, two things are especially important: there should be reasonable regularity of supply, and uniformity of quality in the product. The Dane seems to fully appreciate this fact, and he aims to be in the market at all times so that his customers may not be disappointed and look elsewhere; and the uniformity in the quality of his product has given his goods an enviable reputation, so that Danish bacon commands a substantial premium over other brands.

4. Denmark is a butter-making country, and the feeding of hogs is found to be a profitable means of utilizing skim-milk and butter-milk. The extension of dairying in Denmark is no doubt responsible for the increase in bacon production, and whether the Dane has yet reached his limit in the production of bacon, depends entirely upon whether he has reached his limit in dairying.

5. The Danish government, the press, the packer, and the farmer are all working in harmony for the promotion of the industry.

There may be other reasons for Denmark's supremacy in bacon production, but sufficient have been cited to give a clear idea of the difference between Canadian and Danish conditions, and this brings us to the most difficult point: what of the future?

Though there has been of late a marked decrease in our export trade, there has been an increase in our home market. It is impossible to obtain figures relating to this increase, but the opening up of our western country has created an important market for eastern bacon. It is not safe, however, to rely upon the permanence of this market, because it seems only reasonable to suppose that as time goes on the west will produce hogs in increasing numbers. In the meantime, the western consumer is of great importance to us, and will probably help us over some difficult places, but we cannot afford to lose sight of the English market.

There seems to be no good reason why we should turn over the British market to the Dane. We grant that he has certain important advantages, but we have an immense advantage in the matter of cost of production, and we could drive the Dane out of the British market if we went about it the right way. It would mean more careful attention to the details of feeding, and more care in the selection of our breeding hogs. The Dane has learned to supply his customer with what he wants. When we learn the same lesson, Canada can once more assert her supremacy in the British market.

The extension of dairying in this country, is working in the interests of the bacon industry. There is probably no animal which can make better use of dairy by-products than the hog, and there is probably no satisfactory substitute for skim-milk and butter-milk in hog feeding. It looks, therefore, as though in Canada, as in Denmark, our production of bacon will be governed by the extent of our dairying operations.

The chances are that, to say the least, it will be a long time before we have successful co-operative packing houses in this country, so that, in the meantime, we had better look carefully into conditions which prevail at present, and which are likely to prevail for some time to come, with a view to deciding what is the wise thing to do. Feeding bacon hogs either pays, or it does not pay. If it is only a moderately profitable adjunct to our business, we had better foster it and try to improve it, for profitable branches of agriculture are not so numerous that we can afford to treat them lightly. If it is wholly unprofitable, then we had better discard it, but before deciding upon such a serious step, we should have conclusive evidence that we are right. Undoubtedly, some men have found bacon hog feeding unprofitable, and have wisely decided to drop out of the business; but it does not follow that one man's experience should be the same as that of his neighbor, and we have ample evidence that other men have found the business to be very profitable indeed. Let us face this problem with open minds, and let us be very sure that the hog is unprofitable for our conditions before we decide to discard him. The hog is generally carried most profitably as an adjunct to other farm operations—as a sort of side line, if you like the term better—and fills this capacity most successfully upon a dairy farm, especially where butter-making is the specialty. On other farms, we find him in smaller numbers, consuming odds and ends of refuse which would otherwise be wasted, and turning them to good account, along with a certain amount of food which has a market value. The man who loses money on hogs is usually the man who overstocks his premises, and attempts to keep hogs under circumstances which make success impossible. What is needed to-day is a wise conservatism in regard to the hog industry, careful comparisons of the profits from hog raising with those from other branches of our business, and careful study of methods likely to reduce the cost of production.

There seems to be no doubt that the bacon hog has come to stay. Apart from the British market, there is an ever widening home demand for lean meat which the bacon hog alone can fill. If we drop the bacon hog at this critical juncture, we may expect to see the swine industry shrink to a much greater extent than it has shrunk already, unless some unforeseen circumstance opens up a fresh outlet for our surplus product. The farmers of this Province have already sacrificed millions of dollars through lack of uniformity in the product they have sent to Great Britain. Shall the next step we take be backward or forward? This is the question the farmer must answer for himself, according to the dictates of his own judgment.

When we come to sum up the whole matter, we find that of late we have suffered a set back in the British market, and that our principal competitors have made a large stride forward during the same time.

The conditions which prevail in connection with the marketing of our hogs, are likely to continue for an extended period at least.

The question for the farmer to answer is: "Can I afford to dispense with the hog?"

If he answers this question in the negative, there is still another one to face, namely: "Shall I feed the hog which fills the demand of the consumer, or shall I tamper with the hog which has caused our bacon to be sold at a discount upon the British market?"

This is a free country. Every man has a right to feed any kind of hog which pleases his fancy. It is just as well, however, to make sure that the course we are following is the one which will eventually prove to be in our own best interests.

ALFALFA GROWING IN ONTARIO.

By C. A. Zavitz, Professor of Field Husbandry, Agricultural College, Guelph.

There is probably no one crop in which a greater interest is being taken by the farmers of Ontario at the present time than Alfalfa. Although it has been grown more or less throughout the Province for many years, it is only recently that farmers, generally, are realizing the value of this crop, where it can be grown successfully. Experiments with Alfalfa have been conducted at the Ontario Agricultural College for about eighteen years, and co-operative tests have been made throughout Ontario with seed distributed through the medium of the Experimental Union in each of at least a dozen years. From the results of these various experiments, as well as the practical experience of farmers who have been growing Alfalfa in a larger way, we have been enabled to glean some valuable information. We find that in some instances Alfalfa does exceptionally well, and in others it proves an utter failure. The farmer who has suitable land for the growing of this crop is enabled to secure excellent returns. As Alfalfa is an exceedingly deep rooted plant, it does not thrive well on a soil which requires underdraining, but when good seed is properly sown on land which is either naturally or artificially well underdrained, it will frequently give magnificient returns for a number of years.

Alfalfa as Feed: Alfalfa, or Lucerne as it is frequently called, furnishes food of high feeding quality. There is probably no crop grown on the farms of Ontario which is more nutritive than Alfalfa when it is carefully grown and properly cured. The amounts of digestible food constituents and the nutritive ratios of Red Clover and Wheat Bran, as compared with those of Alfalfa, are here presented and are worthy of attention.

Varieties.	Protein.	Carbohydrates.	Nutritive Ratio.
Red Clover	6.4	38.5	1 : 6.0
Alfalfa	10.4	43.0	1 : 4.1
Wheat Bran	12.0	45.4	1 : 3.8

It will be seen from the foregoing figures that Alfalfa contains a greater percentage of digestible protein and of digestible carbohydrates, and has a narrower nutritive ratio than Red Clover. It will also be seen that the difference between Alfalfa and Wheat Bran is much closer than one would imagine.

ELEMENTS OF FERTILITY IN ALFALFA: Alfalfa is probably one of the easiest crops which can be grown on the land. It attains a large proportion of its nitrogen from the air and of its mineral matter from the subsoil. In these two respects it differs almost entirely from our cereals and our root crops. According to chemical analyses, the fertilizing elements in one ton of average Alfalfa is worth as follows: Nitrogen, $5.25; Phosphoric Acid, 41c.; and Potash, $1.68, making a total of $7.34. As these valuable fertilizing constituents have been largely derived from the air and the subsoil, it will be seen that the growing of Alfalfa is exceedingly easy on the surface soil. When the crop is fed to animals and all the manure is carefully maintained, it is considered that from 75 to 90 per cent. of the fertility of the crop can be returned to the land in the form of manure.

From practical experiments conducted at the College, it has been found that after the Alfalfa crop has been removed from the land and the sod has been plowed and sown with winter wheat, barley or corn, that the results are very much better than those obtained from Timothy sod, when treated in exactly the same way.

MECHANICAL INFLUENCE ON THE SOIL: Not only does the Alfalfa crop prove of great value in regard to the fertility of the soil, but it also has an excellent influence on the land from a physical standpoint. From experiments which have been made at Guelph, the inverted Alfalfa sod was found to be exceedinly loose and mellow and in an excellent condition for future crops, while that of Timothy, Meadow Fescue, and Orchard Grass was much less friable.

THE PLACE OF ALFALFA ON THE FARM: As Alfalfa does not reach its full development until the third year after it is sown, it is considered to be less suitable for short rotations in Ontario than the Common Red Clover. For various reasons, however, there are certain fields which many farmers do not wish to bring into their regular rotation. Frequently some of the fields are along hillsides or are unsuitable for grain growing where frequent seedings are necessary. In many instances the farmers are devoting their attention largely to live stock, and are desirous of having more permanent crops for pasture and for hay, with smaller proportions of the farms devoted to the short rotations. The Alfalfa is proving a most valuable crop for instances such as these, and others which might be mentioned.

Uses of the Crop: The green fodder produced by Alfalfa is both nourishing and appetizing. It is often an advantage to start to cut Alfalfa for green fodder some time before it has started to bloom. The portion of the crop which cannot be used for this purpose before one-third of the blossoms have made their appearance should be cut and cured into hay. The fact that Alfalfa is a perennial plant, as well as the fact that it produces two, three or four cuttings in the one season, makes it a very desirable crop to use for the production of green fodder for feeding to farm stock.

For the production of hay it is a most valuable crop. Under favorable conditions it produces large yields of hay of excellent quality. Very great care, however, should be taken to cut the Alfalfa just as it is starting to come into blossom, and always before it is more than one-third in bloom, as the crop very rapidly depreciates in digestibility after it has reached the stage of maturity referred to above. Great care should also be taken to not allow the Alfalfa to lie very long in the hot, dry sunshine, as the leaves soon become crisp and are easily broken from the plants. As the leaves are the richest part of the Alfalfa, special care should be exerted to have as few as possible lost. After the crop becomes sufficiently wilted it should be raked into winrows, and the curing process should be finished in the winrows or in the cocks.

In the average results of experiments conducted at the College in four different years, Alfalfa, when grown alone, gave a greater yield of pasture per acre than any one of the following crops: Common Red Clover, Mammoth Clover, Alsike Clover, White Clover, Yellow Trefoil, Sainfoin, or Burnet. When grown and pastured alone, however, there seems to be even a little greater risk of cattle and sheep becoming bloated when pasturing on Alfalfa than when pasturing on clover. There is also a danger of either cattle or sheep eating the Alfalfa so closely to the ground that they are apt to injure the crowns of the roots, and in some cases entirely kill the plants. Some very excellent results have been obtained from pasturing hogs and poultry on Alfalfa.

The writer has never heard of injurious results from bloating with any kind of farm stock pasturing on Alfalfa, providing it is used in combination with grasses and clovers in the form of a permanent pasture.

In each of five or six years, seed has been produced at the College from either the first or the second cuttings of Alfalfa. The results have been about the same from each cutting. The production of seed has been only fairly satisfactory at the College, but in some parts of Ontario Alfalfa seed growing is becoming an important industry.

No extensive experimental work has been conducted at the College in the production of Alfalfa silage, but a few reports have been received, stating that the crop can be used in that way with fair satisfaction.

Alfalfa certainly produces a large amount of exceedingly valuable material to use as a green manure. In the majority of cases, however, it is probably better to use the crop for feeding purposes, and then to save the manure and return it to the land in that form rather than to plow under the whole crop.

It is quite probable that there are many crops more suitable for using as a cover crop in orchards than Alfalfa. The growth of the plants is upright and rather open, and the roots penetrate so deeply into the soil that they tend to rob the subsoil of its fertility and of its moisture, both of which are so essential to the best welfare of the trees.

Soil Conditions Suitable for Alfalfa: It is practically useless to attempt to grow Alfalfa on a cold, wet soil. The crop usually thrives well, on almost any kind of a fertile surface soil, providing the subsoil is sufficiently open to allow the roots of the plants to penetrate through the moist soil before reaching the water-level.

It is also of great importance that the surface soil be thoroughly cultivated and free from weeds and weed seeds before the Alfalfa seed is sown. If the land is suitable, Alfalfa can usually be grown with much success in Ontario, providing the land is properly prepared and good seed is sown in the best way.

DIRECTIONS FOR GROWING ALFALFA: There are different ways of laying down a field to Alfalfa, and we would suggest the following method as one which is likely to give very excellent results. Select land having a clean, mellow, fertile surface soil overlying a deeply drained subsoil having no acidity. Use large, plump seed, free from impurities and strong in germinating power. Inoculate the seed with the proper kind of bacteria, providing Alfalfa has not been grown successfully on the land in recent years. As early in the spring as the land is dry enough and warm enough to be worked to good advantage, make a suitable seed-bed and immediately sow about twenty pounds of Alfalfa seed per acre from the grass seed box placed in front of the grain drill, and about one bushel of spring wheat or of barley per acre from the tubes of the drill. Smooth the land with a light harrow or with a weeder, and if it is very loose and rather dry, also roll it and again go over it with the harrow or the weeder. As soon as ripe, cut the grain and avoid leaving it on the land longer than necessary. Give the Alfalfa plants every opportunity to get a good start in the autumn in preparation for the winter. If for hay, cut each crop of Alfalfa in the following year as soon as it starts to bloom. In curing, try to retain as many of the leaves on the stems as possible, and to protect the crop from rain. Never cut or pasture Alfalfa sufficiently close to the ground to remove the crowns of the roots, and thus injure or possibly kill the plants. If these directions are followed, the Alfalfa may be expected to produce large and valuable crops for a number of years without re-seeding.

HENRY GLENDINNING, of Manilla, pointed out that it was entirely undesirable to allow stock to run on the Alfalfa field, because the animals eat it off close and in many cases pulled out the crown of the plant, thus weakening the stand. His early experience was a fair crop the first season, but failure the second season. Since he quit pasturing, reasonable success had attended his efforts, and although the second season's crop generally was the weakest it was quite satisfactory. The general practice was to seed to Alfalfa on land that had been in roots the previous season. He did not consider the ordinary mowing machine the best implement that could be made for cutting Alfalfa because the leaves and blossoms instead of the sappy stems were left exposed to the sun. Since no satisfactory implement was available the next best thing was the free use of the hay tedder with which he preferred to run over the fresh hay twice the day it was cut. After cutting in the morning when the dew was gone and giving two such treatments as here described, it was ready to be coiled that evening. Then it was left in the coil until about ready to come in the barn, when the coil was upset so that the base could become well aired. For second and third cuttings it was not necessary to use the tedder so freely because of thinner stands and less sap at the seasons of these cuttings.

Q.—What bulk do you consider a good crop?

A.—About five or six tons per acre per year.

Q.—Is there not great loss of time cutting the same ground so often and hauling the hay to the barn?

A.—I do not mind spending time when I get results. I can grow Alfalfa at a cost of $2 per ton.

Thompson Lawson, of Hamilton, said that Alfalfa had been grown for seed successfully in the Niagara District. In so doing two cuttings of hay were lost. A paying crop averaged two to two and one-half bushels per acre, but he had seen as high as five bushels per acre. It was necessary to keep all weeds out of the growing crop, as many of the worst weed seeds could not be removed from the threshed seed by machinery.

Q.—Will it pay a man to grow his own seed instead of buying it from seedsmen?

A.—I have known as low as one-half bushel to the acre to be threshed. In this case it did not pay as the two extra cuttings of hay would be worth more than that yield of seed.

Q.—How does the production of seed affect the crop the following year?

A.—It has no injurious effect. The crop comes on the following season as strong as ever.

WEEDS, THEIR IDENTIFICATION AND CONTROL.

By George H. Clark, Seed Commissioner, Department of Agriculture, Ottawa.

Let me commence by adding another quota of congratulations to the exhibitors in the seed department and to the management of this winter fair, because of the excellence in quality and attractiveness of the exhibits of seed grain and other seeds. It is certainly encouraging to those of us who have made some effort to suppress the general distribution of noxious weeds and to improve the seed supply, to find here on exhibition such numerous representative lots of thoroughly good clean grain of the best kinds. I am advised that each exhibit in the special class that grew out of the field competitions that were conducted in the Province of Ontario during the past year—each exhibit of two bushels could be taken as fairly representative of several hundred bushels of equally clean grain that is held for sale. With the information respecting these supplies at hand, we will not expect to have this year, as in past years, those statements from some seed merchants, given as an excuse for violating the provisions of the Seed Control Act, that they are unable to procure supplies of clean seed. With the information I have obtained to-day concerning the supplies and the quantity available for seed. I shall be able, through our staff of seed inspectors, effectively to reply before the court to such appeals for special consideration. These field competitions, which have been organized during the past two seasons by the Provincial Department of Agriculture for Ontario, and assisted by the Seed Branch of our Dominion Department, will, if continued from year to year, prove to be one of the most potent factors in agricultural education looking to better crops and cleaner farms. From the information supplied by the judges who were sent out by the Seed Branch to award the prizes in those competitions for the various agricultural societies, it is clear that weed growth has greatly increased during the past ten years, which have been expensive years for farm labor. The cost for labor in fighting weed pests has grown to be a serious problem in farm management. The observation made by the judges made clear too that a large proportion of the farmers of Ontario continue to be slaves to routine in farm operations as practised by their grandfathers.

This routine is one of the greatest enemies to the farmer, because he is absolutely unable to cope with the present-day weed, insect and fungous pests unless his system of farming shall include the arrangement and rotations of crops best suited to their suppression and extermination.

The older men in this audience will, I have, no doubt, remember their introduction to the first weeds which gave trouble in the province of Ontario. They will remember that on newly cleared land, sown with wheat, they did not harvest a crop of mustard or Canada Thistle. During the past fifty years new kinds of weeds have been added; rather slowly at first but more rapidly as transportation facilities have developed. But at no time has the wholesale distribution of weeds gone on in the province of Ontario to such an alarming extent as during the past decade.

The trade in agricultural seeds has been blamed for much, and was found guilty of being the means of a general distribution of many kinds of noxious weed seeds. But the worst evils of the seed trade have, in a large measure, been corrected. We have, nevertheless, many and continued appeals from farmers and agricultural organizations for a further tightening of the rope on this source of weed distribution. Perhaps the time is now ripe when further adjustments of the grades of agricultural seeds can be made to advantage; but it seems to me to be rather unfair to expect that the hands of one class of business men should be completely tied, while another class of business men or farmers, who are now doing greater injury to Ontario agriculture, are allowed to go Scot free. And that leads me to make some observations concerning the condition in respect to weed seeds of the so-called feeding stuffs or feed grain, that are transported and sold for the purpose of feeding over the province of Ontario. We have found that many of the flour mills in the province of Ontario pipe the screenings from their cleaning plants directly into the bran bin. Others keep them apart for crushing or grinding with grain for feeding stuffs. It is entirely practicable for any miller to so separate the small from the large weed seeds before grinding that the process of manufacture into ground feed stuffs will destroy the vitality of all seeds contained therein. But it is rare indeed to find any such feeding stuffs put on the market in the province that do not contain vital seeds of some of our most noxious weeds.

A special source of danger to the province of Ontario is the screenings and ground feeding stuffs which have been coming forward from the cleaning plants at Port Arthur. It is only a few years ago now since an amendment to the Manitoba Grain Inspection Act authorized the chief inspector of grain to mark on the certificate of inspection Grade 2, clean six per cent. rather than otherwise to give it a lower grade. Such a car is cleaned at Port Arthur before being binned in the elevator. The screenings removed therefrom become the property of the cleaning plant, and in the course of a year many hundreds of tons of such cleanings are accumulated. Such seeds as wild buckwheat, lamb's quarters, wild oats, and many other kinds of weed seeds, have a feeding value, and the necessary machinery for grading and grinding those screenings has been installed. Millers throughout the province also obtain carlots of the unground screenings, which come forward to them all rail and are crushed or ground with coarser grains, and offered for sale as feeding stuffs. These cleaning plants have their travelling agents, disposing of their accumulated supplies of screenings, either whole or in the ground state. More than one-half of the one hundred weeds which I have to show you from lantern slides, made in their natural color, have been introduced into Ontario from the western provinces, and largely, I believe, through this trade in feeding stuffs, which has largely increased, so far as

Port Arthur and Fort William are concerned, during the past eight years. This particular source of evil is peculiar to the province of Ontario. The cost for freight leaves the province of Ontario—or, at least, points west of Montreal—the most desirable market. It is my conviction that this evil can not be effectively corrected by Federal legislation, because whatever legislation is made by our Dominion Parliament must be applied alike in the province of Ontario and in the western provinces where those weed seeds are produced. The provinces of Manitoba, Saskatchewan and Alberta have enacted legislation to cope with these nd kindred evils which are peculiar to those provinces.

I would also remind the farmers of Ontario who occasionally appeal for a more stringent Seed Control Act that it is the privilege of any fifty farmers, by petition, to require their municipal governing body to appoint an inspector of weeds and enforce the suppression of noxious weeds within the municipality. There are indeed very few municipalities in the province of Ontario which employ weed inspectors, and in that way put into operation the laws enacted by the Provincial Legislature. I am inclined to the opinion that the best interests of all concerned would be well served if the province of Ontario would enact a law, making it compulsory on the part of the municipal governing bodies to each year name at least five and not more than fifteen of the most noxious weeds in the municipality, and appoint and maintain an inspector of weeds who would look after their destruction.

I have named three main sources of noxious weed distribution, all of which are known to seriously pollute our farm lands, namely, the seed trade, the trade in feeding stuffs and feed grain, and local distribution by natural agencies. The worst evils of the seed trade have quite largely corrected. An adjustment of the grading of grass and clover seeds may be made, but higher standards of quality in those grades may not be practicable until restriction has been applied to these two other sources of noxious weed dissemination.

There are several ways of classifying weeds. They may be classed according to their manner of natural distribution. We speak of weeds which are distributed in time and weeds which are distributed in place. Those weeds, the seeds of which when mature drop to the ground near the plant, usually possess a seed coat which is partly impervious to water, a seed coat which will preserve the vitality of the seed for several years. From an examination of a large number of samples of soil, we find that on land that has received good cultivation, land that is under a short rotation of crops, a square foot of the average soil, taken furrow depth, would contain not more than, approximately, two hundred of such weed seeds. Other lands which are sometimes said to be foul with noxious weeds would contain as many as fifty thousand of such weed seeds in a square foot of soil furrow depth. When such weed seeds come within an inch, more or less, of the surface, they will germinate and produce plants, even after many years. We call these weeds which are distributed in time. In dealing with such weeds the principle must be, to adopt a system of cultivation so that these weed seeds in the soil may be brought to the surface soil and germinated, and, after germination, the plant may be conveniently destroyed before it has had time to produce a new crop of seeds.

Other weed seeds when ripe possess a pappus or downy structure attached to the seed—as the Canada Thistle, which is familiar to all farmers—by which the seed is carried for long distances by the wind. As a rule, seeds of this kind are short-lived. Most of them have not that protective covering common to the mustard seeds. We call them weeds which are distributed in space. But there is another class which may be distributed both in time and space—in time through being perennial and having underground root stocks, and through space by the weed seeds which are carried long distances by the wind. The perennial sow thistle is a good example of this, and is one of our most noxious weeds. Another means of classifying weeds is by the terms annual, biennial and perennial, according to their length of life after the seed has germinated. Annual weeds mature their seeds and the plant dies within a year from the germination of the seed which gave it life. Biennial plants spend the first season in growth of leaf and root, and produce their crop of seeds only during the second season, after which the mother plant dies. A perennial plant will live for several years, continuing to reproduce annually.

Of the one hundred stereopticon views which I have to show you, illustrating as many weeds which are known to have been introduced in the province of Ontario, probably not more than twenty or twenty-five of them would be classed as seriously noxious weeds. Others are of secondary importance. A great many of them will be entirely unfamiliar to Ontario farmers because they have only recently been brought into Ontario and are not yet generally distributed. Many of these weeds have proven to be seriously noxious pests in the western provinces or in other countries; but that is not to say that they will prove to be pernicious weeds in Ontario. In any case, it would be well for the farmer to claim the benefit of the doubt and exterminate them before they have an opportunity to increase and show whether they are likely to become seriously noxious. I regret that it will not be practicable to have all of these weeds reproduced in the press in their natural color, as I am fortunately able to present them this evening by stereopticon views; but I am pleased to be able to announce that more than half of these weeds are illustrated in the book, "Farm Weeds of Canada," copy of which is now available to all farmers in Canada through the libraries of their rural schools. I am also glad to be able to intimate that a revised and enlarged edition of that book, which will contain 76 colored plates of these weeds is in course of preparation. This book will be issued by our Department of Agriculture at considerable cost, and, when completed, will, I anticipate, be made available to individual farmers of Canada at a nominal charge. I do not approve, and I know that the Honorable the Minister of Agriculture does not altogether approve, the principle of requiring farmers to contribute in that way something toward the expense of publishing information which should be made available to them free of cost; but from our experience in distributing the first edition, which has gone almost entirely to the public institutions of Canada, I have no hope of being able to satisfy the demands of our Canadian people in the free distribution of this publication that is expected to cost about $1.40 per copy, which large cost is almost entirely due to the expense of illustrating these weeds in their natural colors.

SEED EXHIBITS.

By J. Buchanan, B.S.A., O. A. C., Guelph.

I am very glad to have the opportunity to say a few words in regard to the seed division of the Provincial Winter Fair. For three years I have had the task of judging all of the seeds and potatoes, excepting the special class of white oats which Prof. Klinck and his brother judged this year, and I am pleased to be able to report marked improvement in the quality of the exhibits.

I was not aware of the fact, until Prof. Klinck mentioned it a few minutes ago, that he had awarded first prize to an exhibit "New Sensation" oats in the large special class which he judged. It will be interesting for you to know that both first and second prizes went to exhibits of the same variety (Sensation) in the class for white oats in the regular exhibition. There were eighteen exhibits in this class, and there were so many good ones that it took some time to select the winners: then, on looking up the names of the varieties, after having made the awards, I found that both first and second prize lots were of the "New Sensation" variety.

Now, let us consider the seed exhibition for a few minutes, first from the standpoint of the exhibitors and afterwards from the standpoint of the exhibition authorities. From year to year the exhibitors are improving the quality of the seeds which they place on exhibition, and this year there were very few, if any, discreditable exhibits. Many of them were excellent in quality, and one lot of white peas was so good that I would find no fault with it. Had there been another one as good, I think it would have been necessary to award two first prizes. This lot looked as if each pea had been measured in order get them all of exactly the same size, and I could not find a weevily nor a wormy pea, nor a broken or discolored pea in the bag, no matter how far I put my hand down into it. The only thing I found in the bag, that should not have been there, was a small metal nut from the end of a bolt. The hole in that nut was just about the same size as the peas, and I wondered whether the exhibitor had used the nut as a measure and had pushed each pea through the hole in order to get them of uniform size. This man, and many others, deserve much credit for having carefully prepared their exhibits of seed grain. It may, therefore, be said that, from the exhibitors' standpoint, the seed division of the fair is making good progress.

This year those in charge arranged to have the seed exhibits placed on the ground floor of the building in a location where they attracted much more attention than in previous years, and I think it is correct to say that for the first time the seed section is a really important part of the Winter Fair. This was a step in the right direction, but there is still room for improvement. The seed grain is still exhibited in open bags which are set aside by side, and as a result the samples get badly mixed when they are being examined by visitors. A man will pick up a handful of grains to look it over, and when he throws it back, part of it will drop in another bag. Now these samples are of considerable value to the exhibitors, and when they are thus mixed their value is practically lost. I would therefore suggest that the exhibition authorities appoint a committee to thoroughly discuss the matter, and to draft out a first-class method of arranging the seed exhibits so that they could be seen to good advantage and yet not be handled or mixed. It seems to me that uniform boxes or cans could be constructed of suitable size to hold the regulation amount of grain, and covered with close fitting wire netting tops. This is simply a suggestion, but I think the whole matter might be dealt with by a competent committee and some further improvement made before the next exhibition is held.

REPORTS OF JUDGES ON POULTRY EXHIBITS AT THE ONTARIO PROVINCIAL WINTER FAIR, 1908.

By Jas. A. Tucker, Concord, Mich.

The Wyandotte classes at the great Guelph show contained some of the best birds I ever judged. Whites come first; 1st, cock one of the best, if not the best, I ever handled, every curve a Wyandotte, good in head points and white, an easy winner, looks like first winner a year ago; 2nd, not so good in shape, but an easy second; 3rd, a white bird and finished, wins out over several good birds on account of being finished. Balance of winners good ones, but hard to judge on account of plumage being out in wings and tails. Hens,—a nice class, but several good birds not ripe in plumage; 1st, a grand bird in shape, just a little too tight in feather; 2nd, we think a better bird when in full plumage; 3rd, a Wyandotte in' shape, but set back on account of ticking in plumage; 4th, a good one when farther along; 5th, a big one and wins on color, more a Cochin shape in back; balance of class good birds and could win in most shows. Cockerels a grand bunch; 1st, about the best I ever handled, a Wyandotte from head to foot and white as they make them; 2nd, some good type but not as good in back and tail shape, white as snow; 3rd, a grand shaped bird, but not quite ripe in plumage; 4th and 5th, good in Wyandotte type, but hardly finished; balance of class contains many good birds that will win in good company in January shows. Pullets a great lot; 1st. 2nd and 3rd look quite a bit alike. We like first pullet best, as we consider her better in back and tail shape; 4th and 5th could win in most shows, the class as a whole about the best I ever handled. Silver Laced Cocks,—some of the best laced breasts and bodies I ever saw. Equal to Sebrights. The first cock was sounder in neck, back and flights. The Silver also lacked Wyandotte shape. First hen a very nice laced one but bad in hackle, too dark at lower end of hackle; balance of winners could win in most shows. Two very nice hens left out on account of very bad combs. Cockerels,—very poor in shape; 1st a very nice, clean bird, but stands a little high, may settle and make a good cock; 2nd, a big bird, good breast and body color, tail carried too high; 3rd and 4th, pretty good ones, but hardly finished. Pullets,—some very nice colored ones, but too long in body and back. The winners were good clean, colored ones with good combs but lack Wyandotte type. The winning cock in Golden is a good one, rich in color and quite a fair comb and good in shape; 2nd, not quite as good in comb nor sound in color; 3rd and 4th, good birds, but off in color and shape to first and second. 1st hen, one of the best we ever handled, good size and shape, and very clean in color; 2nd, another good one but smaller; same might be said of 3rd and 4th. 1st Cockerel in Golden wins out in shape and head points; some nice laced breasts and bodies, but balance of winners set back on combs and color of flights. Pullets,—some very nice ones; 1st, a nice clean colored one, with good comb and fairly good shape; balance of winners very good. Buff Wyandotte cocks; 1st, one of the soundest and best colored birds I ever handled, was an easy winner; 2nd, another good one; 3rd, a little smaller, but nice shape, a little darker than first; 4th, a very good one, but not as sound in color or good in shape as 2nd and 3rd. Hens,—1st, an easy winner, good Wyandotte type and even in color; 2nd and 3rd, good sound color, but not Wyandotte in shape; balance of class pretty good birds. Cockerels,—best shaped bird in class was 3rd, he had a very large coarse comb, and we sent him back. 1st, quite a good bird but hardly old enough, same is 2nd, will be bettter in January shows. Pullets were a nice even colored lot, but lack Wyandotte back and body. Blacks,—1st cock wins easy as he was in fine condition, good Wyandotte shape and good in color; 2nd, wins from 3rd in shape; 3rd, a very nice colored bird. Hens,—1st, wins over balance of class in shape and soundness of color. 1st Cockerel, quite a promising bird; 2nd and 3rd, good. Pullets,—one of the best in shape, was disqualified for a white feather in wing, was sorry to have to do it, but it is the law. Several Blacks with yellow shanks and good shape were shown but they were very white in under color. Silver Pencilled,—a small class, quality not as good as in other classes; 1st and 2nd cocks were very nice top colored birds, but failed in flights and under color of hackle and saddle. 1st and 2nd Cockerels, also 1st and 2nd hens, good birds; pullets not good ones. Columbians,—1st and 2nd cocks were good in Black and White, a little coarse in comb; 2nd cock is bad on wing; one of the best in class was disqualified for stubs in shanks. 1st hen, an easy winner; 2nd, a good one; 3rd, also a good one; 4th, good shape, but too light in hackle, wing and tail. Best cockerel in class was disqualified for stubs in shanks. First cockerel carries a good hackle, good wing and nice tail; 2nd, not quite as clean in color; 3rd and 4th, good type, but a little creamy in color, will make good breeders as they were good in shape. Pullets,—quite a good lot; 1st, wins in size, shape and color. One of winners was best in hackle, wing and tail I ever saw. 1st hen and 1st cockerel and winning pullets were the attraction in this class.

Rose Comb White Leghorns: Not a very strong class. Winning cock, hen, cockerel and pullet above the average. Some good birds in this class that were not through the moult, plumage not right.

S. C. Rhode Island Reds: Cocks, 1st, an exceptionally good one, good head, quite sound in color and very good shape; 2nd, close up to 1st; 1st hen an easy winner, about best red hen I even handled, she was a hen, too, I have found several red pullets entered as hens, 2nd hen a good one if first was away, balance fair, 1st cockerel, nice head, good sound color, too flat in breast and narrow in body; 2nd. a nice bird, a little uneven in surface color, but sound under; 3rd, close up to 2nd, 4th and 5th fail in under color, several nice shaped birds go to pieces in color. 1st pullet a nice red, good type and very sound; 2nd, close up to first; 3rd and 4th, both good ones; balance of class contained a few good ones. Rose combs not a very large class; 1st and 2nd cocks not far enough along in moult to be at their best, but win out in shape and soundness of color; 1st hen an easy winner; 2nd, a good hen, but not rich enough in color; 3rd and 4th, not in it with first and second. 1st cockerel an easy winner, sound in color and very good in shape; balance of class lack color. 1st pullet a dandy, about equal to 1st single comb; 2nd, close up to first; 3rd and 4th, good birds, above the average.

By R. Oke, London.

Buff Orpingtons: Cocks,—1, a good one, good color, little coarse in head; 2, has better comb, fails trifle in size; nice level color, good legs and feet; 3, fails little in size and lacks breast, good color; 4, good but out of color. Hens,—1, a grand one, absolutely clean tail, great color all through; 2, good type, trifle light in color, shows little shafting; 3, light color, but level, fair type; 4, big, little mealy, good legs and feet. Cockerels.—1, big, nice shape, good color, black, nice legs and feet; 2, about same type, bit higher color, not as good comb; 3, fails bit in shape of breast, good color; 4, fails in size, somewhat chestnut in color, and trifle narrow. Pullets,—1, nice color, neat head, fails little in shape of breast; 2, good one, little peppery in tail; 3, trifle coarse in comb, not as good surface color, clean tail; 4, good color, fails little in front and shape of breast, bit narrow at saddle.

S. C. White Leghorns: Cocks,—1, great comb, head and lobe, good shape of neck, bit sappy in color; 2, heavier comb and lobe, better finished and whiter, fails to one on shape; 3, good shape and color, but gone in face, bit pinched in tail. Hens,—1, neat comb, fair lobe, good shape on neck and back, but bit pinched in tail; 2, neat head, nice color throughout, little low on legs; 3, fails little in shape, good color, nice tail, but carried trifle high. Cockerels,—1, a grand one, elegant head piece, good eye, nice tail, good legs and feet; 2, fails to first on comb and lobe, lacks finish, but a good one; 3, not quite as good in comb or lobe, but a nice one; 4, bit rough in comb; 5, also a good one, will yet surpass 4. Pullets,—1, good head, eye, comb, wattle, fails trifle in lobe, good legs and feet; 2, close up, hardly so clean in lobe, little more pinched in tail, otherwise a good one; 3, good, carries tail bit high, lacks color of beak and legs; 4, coarse in comb.

Black Leghorns: Cocks,—1, trifle heavy comb, good color and condition, little high in tail; 2, not as heavy in comb, fails in lobe, and not so rich a color. Hens,—1, good shape, trifle coarse in comb, good plumage, good legs and feet; 2, better legs, not as good in under color in tail; 3, fails shape and comb, bit pinched in tail, legs and feet good. Cockerels,—1, good shape little heavy in comb, good carriage tail, fails color, legs and feet; 2, trifle high tail, heavy in comb and not as good color; 3, also heavy in comb. Pullets,—1, neat comb; nice shape and top color, trifle off on legs, a good one; 2, neat comb, good color, fails in leg color; 3, little heavy comb, trifle coarse throughout.

R. C. Brown Leghorns: Cocks,—1, rough comb, otherwise a good one, good color, hackle and saddle; 2, off on comb, good color, close to 1; 3, a good one not up to 1 and 2. Hens,—1, fair comb, good hackle and back, shows a little shafting in wing; 2, fails to 1 on head and neck, color trifle dark; 3, fair head, bit foxy in wing. Cockerels,—1, fair comb, good head, eye, neck, saddle and wing color; 2, another nice one, fails color of saddle; 3, nice comb, good color, fails trifle in saddle striping. Pullets,—1, nice comb and lobe, very even surface color, trifle light; 2, close up, not so mature; 3, rougher in comb, good color breast, fair top color.

S. C. Brown Leghorns: Cocks,—1, nice comb though bit coarse, good color, nice wattle, hackle and saddle, trifle light at base of tail; 2, fair comb, fails little in wattle and lobes, good neck and saddle striping, tail trifle high, 3, neat comb, fair color, lobe and wattle, good back, saddle and tail; 4, fair comb, yellow lobe, fair hackle and saddle striping. Hens,—1, neat comb, fair back, neck and wing color, fails trifle in color of tail; 2, comb hardly out, fails color eye, good color on back and neck, rather pinched tail; 3, fair comb, back color shade foxy, wing little shafty. Cockerels,—1, a beauty, good eye, comb and shape, nice back and saddle, nice size; 2, nice comb, good legs and feet, bit dark at base of hackle; 3, nice all through; 4, heavy in comb. Pullets,—1, neat comb, good eye, nice color of neck, back and wings; 2, good comb and lobes, fails color of neck, bit pinched in tail; 3, hardly out in comb, good neck, and breast, fair legs; 4, trifle better in color, but comb picked, had to go down for this. S. C. Brown Leghorns made a big class with lots of good stuff unplaced. It was hard to do justice in the judging on account of the birds being cooped so high up.

Buff Leghorns: Best class in some years; Cocks—1, neat comb, fails bit in color of eye, good color otherwise; 2, rougher in head, bad lobe, good color; 3, a little small, good color, nice lobe and comb. Hens,—1, good head and eye, level color, clean tail; 2, very similar color, little pinched in tail; 3, little high in color, bit coarse in head. Cockerels,—1, good legs and feet, nice color, rough in head; 2, neat head, even surface color, fails shape of tail; 3, bit heavy in comb, level color, flat in breast. Pullets,—1, little heavy in comb, good color, tail, legs and feet; 2, pinched in tail, otherwise close up to 1; 3, high in tail, bit faded in color; 4, bit dense in color.

By H. P. Schwab, Irondequoit, N.Y.

Plymouth Rocks: Before commenting on the winners, as I found them, I wish to call special attention to a few noteworthy facts as they were presented to me. I have given it as my opinion that the general quality has been improved over that of a year ago. I wish to call special attention to the evident improvement made in the shape of all the Plymouth Rock classes. This feature was particularly noted by the writer with much satisfaction and when we fully considered that shape is type, and is the most important point we have to breed for, then you will better understand with me the real value of the improvements made. It is now very evident that the breeders have a firm grasp on correct shape, and that their future show and breeding birds, as well as their success, will be the better for this.

The color of the winners will receive proper attention in my comments. Regarding the Barred Rock color. I think it best to make a few special remarks, as they deserve it so well. The class as a whole greatly pleases me. Rapid strides have been made within the past year in obtaining an evenness of color that was grand to see. The shade of color of all the winners and of many unplaced birds was a conspicuous feature, as the males and females matched up so well.

Cocks,—1, also the winner of shape special. A grand all around specimen. Typical in form, splendid head points with a strong red eye. Legs clean and set well apart, his color was of beautiful steel blue shade that has to be seen to be fully understood. A most attractive and valuable bird. 2, not shown at his best, rather unfinished in hackle, saddle and tail, a good style of bird, strongly marked surface and finely marked under-color, deep red eye and good head points; 3, a very narrow and strong barred bird, unfinished in breast and tail, good form and no doubt is a splendid breeder; 4, also shown in unfinished condition, this show was just a little early for a few of these choice ones. He was a beauty in type, with extra eyes, legs and beak; 5, typical in every line, choice head points, color not quite as strong as others. Hens,—1, the beauty of the show, typical in every line, evenly, cleanly and narrowly barred with one of the clearest and best barred necks we have ever seen, shape of back ideal, full breast, etc. The general style of her color only excelled by the famous "Fluffy-Ruffles," the New York champion; 2, looks to us like the 1st pullet of last year, if so she has done well, choice in shape and choice of color, extra fine eyes, legs and feet, fails just a mite under on width of bars; 3, very similar to 1st in style of barring, just a half shade stronger in color, should make an extra breeder; 4, this third in shape, color and style of barring greatly resembles the New York winner, straight across barring and a beautiful surface finish, she was shown unfinished in wings; 5, believe this hen has been laying and was not at her best show condition, grand in shape and barring very clean cut and straight. Cockerels,—1, an extra bright and snappy, clean barred bird, with close to perfect head, and shown in the best possible condition of feather, not very large but has quality in his entire make-up; 2, a most promising barred Rock, needs just two weeks more time to show his best form, as he is still unfinished in neck and tail, shape as near ideal as we have seen, with the best head, eye, and comb in class, narrow and clearly barred, and when finished, we can see in him one of the best cockerels we have handled; 3, very similar to 2nd, just a shade stronger in color, and comb not quite so good, will make another peerless show bird and breeder; 4, a very clean, snappy barred bird, good shape, with beautiful head and strong eye, etc., shown rather young, still a most desirable winner and breeder; 5, another young one, and when fully finished will run them a hot race, good in form and style of barring; 6, very similar to above, did not stand up quite so well. Pullets,—1. shown in pink of condition, a perfect gem, shape and shade of color is just what we like to see, it is difficult to find fault with her, as her entire make-up is most beautiful, a great winner; 2, a very snappy barred female with beautiful finish all over, shown a little young, will make a great show hen; 3, an extra fine pullet, and is well barred as we could wish to see, her shade of color strongly resembles the first hen, while her barring is strong and clean, being unfinished in wing placed her down this far; 4, one of the best in shape, a beautiful type, and just as desirable in shade of color and style of barring, think she was over-ripe as she failed underneath; 5, finely barred, just a half shade light and fails in breast: 6, a very choice pullet, extra in neck color, surface and under clean and well barred, not shown at her best, unfinished in tail and back; 7, worthy of a special mention, should make a grand hen. Entire class of the best and rarest quality.

White Plymouth Rocks: Cocks,—1, finished in detail, snow white, and of strong Plymouth Rock type, good comb and head, strong eyes, legs, etc., a most desirable bird and winner; 2, another grand one in type and color, almost equal to first, legs not quite as good and a mite unfinished in tail, pure white surface and under color; 3, another snow white one, of good form, with extra eye and all head points; 4, a great big fellow and a winner of last year, not fully moulted as yet, will be hard to beat when in full feather; 5, a real beauty and would have been placed better except for some ticking. Hens,—1, a perfect gem and as clear as the purest crystal, extra in shape and very strong in eye and leg color; 2, another grand hen close up, finished in detail and of choice form; 3, again we have a strong one, close up in all round, fine quality, very clean cut; 4, good and clean in all sections, choice form; 5, a fine specimen, not shown at her best. Cockerels,—1, between first, second and third it was just about a case of "close your eyes and take your choice." I have never seen three better cockerels at one show; all three had exceptional head points, strong eyes, snow white plumage and the most desirable type. Had not two of these been shown just a little carelessly, it is hard to say what the outcome would have been; I cannot recommend this quality too highly, and in this I am certain there was honor and glory enough for all of these three winners; 4, another beauty with best class, can well be satisfied to follow the above three; 5, a real nice one, a prince in shape and color, but not shown as well as the other winners. Pullets,—1, a pullet of the highest quality in both shape and color, strong yellow legs, extra eye and head points; 2, very choice in shape and of even quality throughout; 3, a grand one from every point of view, except fail just a mite in shape; 4, very similar to first pullet but not shown as well, in fact, but few can be shown as well as the first; 5, good in all ways, but needs but little better condition to properly show up her rare qualities to best advantage. A class of very choice quality.

Buff Plymouth Rocks: The entry in numbers was rather limited, but it had all in quality that it may have lacked in quantity. Shape and evenness of color were prominent. Cocks,—1, very typical with head points and evenness of color excellent; 2, close up, fails a mite in surface color; 3, another choice specimen in color, fails in head points. Hens,—1, just the proper shade of buff, surface and under, very good head and eye; 2, grand in type, good and sound in color, but just a fraction strong; 3, fails in condition, still a rather good one. Cockerels,—1, in shape and color is as good as we have seen, extra head points and a most attractive bird; 2, a strong winner and in several ways near to the first prize birds; 3, very well put up but not as even in color as the other winners. Pullets,—1, she does not leave much to be desired, grand in shape, clean, even color, if she has a particle of foreign color I fail to find it; 2, very nice but not quite as clean in color as the first one; 3, fails just a little under, grand in finish and type. A real high quality class.

By Wm. McNeil, London.

Sultans: This was a very fair class, but nothing special.

Silkies: were about the best lot I have seen. Cocks,—1, was a grand bird, nice crest, grand in shape, good leg and toe feathering, but a little creamy; 2, another nice one about as good; 3, a little small in crest and hardly in as good show shape; balance of class fair. Hens,—1, was a nice one, fine crest, good comb and as white as snow, good leg and toe feathers; 2, a nice one with good crest, splendid in shape, not so good in color as first; 3, another fair hen, good crest, not as good in leg and toe feathers; balance of class all good; Cockerels,—1, a nice one, will make a grand cock, fair crest, good leg and toe feathers, nice shaped tail; 2, and 3, both close up; balance of class fair. Pullets,—1, a gem, fine crest, good shape, good leg and toe feathers, easy winner; balance of class all good.

Hamburgs: were not a large class, but quality was away up.

G. S. Hamburgs: Cocks,—1, a good one and an easy winner, nice head and comb and fine lobes, good in color, well spangled; 2, another good one, very rich in color, but too much white tipping; 3, a fair bird, but looks in color. Hens,—4; 1st, about as good a hen as I have seen for a long time, grand in color and with great spangling, fit to win anywhere; 2, another nearly as good; 3, close up to 2, I believe they are owned by one man. Cockerels,—4; 1st, a good one, but a little too dark on breast but had fine shaped spangles with grand color; 2nd, another good one; 3, a little too young to show, but will be a grand cock. Pullets,—1, 2, and 3, are good ones.

S. S. Hamburgs: Cocks,—8; 1, the best cock I have seen for some time, with grand spangling of the right shape, but a little creamy; 2, another extra fine one, better in color but not as good in spangling as first, but a good one; 3, close up to 2. Hens,—7; every one fit to win; 1, a good one with good comb and ear lobes, grand neck, splendid back, nice tail, good breast, as green as a bottle all over; 2, another good one, about as good in spangling as first, but hardly as good in color; 3, good one, close up to 2. Cockerels,—8; 1, I believe the best of the whole class, it did me good to look at him, he was a grand bird, just right for showing fine comb good wattles and ear lobes, grand back and breast and a good white tail with every feather spangled with pear shape; 2, another nice one, not so big or good as first; 3, another good one; all in the class were good but one. Pullets,—8, 1, an easy winner, if she lives she will be a great hen, she had good shape, fine color, a right shaped spangle, about as green as a bottle; I think this was about the best class of S.S. Hamburgs I ever saw anywhere.

G. P. Hamburgs: 2 cocks, both in good shape; 2 hens in same condition. Cockerels,—3; 1, a nice one, grand in color, good tail; 2, another nice one; 3, close up. Pullets,—5; 1, grand in color, finely pencilled; 2, another good one; 3, close up.

S. P. Hamburgs: Cocks,—3; 1, grand color, nice head and tail; 2, another fair bird, fair comb and ear lobes, not as good in tail; 3, close up to 2. Hens,—3; 1, and 2, both good ones, very fine pencilling; 3, good one but a little darker in pencilling. Cockerels,—1, nice head and comb, good tail, splendid ear lobes; 2, another good one, but a little small; 3, fine big bird, but carried tail too high. Pullets,—1, good comb and ear lobes, nice back, good tail, well pencilled breast; 2, another nice one, not as good on breast; 3, close up to 2.

Black Hamburgs: Cocks,—7; 1, a nice bird, fine head, comb and ear lobes, grand color all over, but tail a little broken up; 2, was a nice one, good comb, ear lobes and wattles, grand in color, but a little bronzed in tail; 3, the best shaped bird of them all, good head, comb and ear lobes, splendid color, but tail bronzed a little and legs a little rough, otherwise a good one, balance of class fair. Hens,— 7; 1, a nice one, good color, nice head and ear lobes, fair comb, nice shaped tail; 2, another good one, but hardly as good in color as 1, fair comb and ear lobes; 3, close up to 2. Cockerels,—7; 1, a good one, splendid head, comb and ear lobes, splendid color, good carriage; 2, another fair bird; 3, close up to 2. Pullets,—8; 1, a good head, nice shaped comb, but a little large, fine in color, good shape, grand tail. I think she won the special for the best hen or pullet; 2, another nice pullet, nice comb and ear lobes not so good in color as first; 3, close up to 2.

Ornamental Bantams.

Golden Sebrights: Cocks,—6; 1, an easy winner, he is about one of the best birds I ever saw, fair comb, good in color all over, very fine lacing; 2, another nice one, good comb, nice back, little heavy in lacing; 3, another good one, good shape, nice color, but too heavy laced. Hens,—7; 1, a good one, and mate for first cock, right shape, nice fine lacing all over, an easy winner; 2, another good one, nice head and comb, fair color, but a little heavy in lacing; 3, close up, balance of class good. Cockerels,—7; 1, good bird, fair comb and wattles, nice neck, good color back and breast, a little heavy in lacing, a little too long in legs and tail, otherwise a good one; 2, another fair bird, a little off on comb, not so long in leg as 1, very even lacing but a little too heavy; 3, close up. Balance of class all fair birds. Pullets,—8; 1, was a nice little one, good in color and splendid in shape, and finely laced; 2, another good one, splendid color, good shape, but a little heavy in lacing; 3, another nice one, but a little high in color, a little heavy laced, otherwise good. Balance of class all nice. I might say, not a poor bird in lot.

Silver Sebrights: Were a grand lot, 11 cocks; 1, was a model Sebright, good comb and right color, nice, short back and square tail, fairly laced and good color; 2, another good one, not as good in comb, splendid shape bird but a little heavy in lacing, otherwise good; 3, a nice little fellow, fair comb, good back, nice neck, fair tail, a little too heavy in lacing, balance of class all fair birds. Hens,—11, 1, was a little gem, short legged, short backed, nice tail, and finely laced all over, and good color: 2, another good one, a little higher on leg than 1, grand color, with a fine tail, but lacing a little too heavy; 3, another good one, good head, nice neck, splendid tail, a little heavy laced, balance of class all good, not a poor one in the lot. Cockerels,—8; 1, was an extra good one, nice head, good comb, well laced neck, nice and short in back, with a good tail, just the right type for Sebright; 2, a little fellow and grand in color, but not so rich in color as first, he will make a grand old bird: 3, another good one, nice comb, good neck, nice back, good tail, well laced all over, but a little heavy; balance of class all fair. Pullets,—1, a little beauty, nice and short on leg, grand in color with very narrow lacing, good tail; 2, another nice one, but not as good as first; 3, close up, balance of class all good.

Black Rose Combs: Cocks,—12; 1, a nice one, good head and comb, and ear lobes just the right type for a Black Rose Comb, with an extra good tail, grand in color, not a white speck on him; 2, another good one, a little off on comb, not so good in lobes, grand in color, with a fine tail, just about the right type; 3, another nice one, fair comb, good lobes, good color, not so good in tail; 4, close up. Hens,—12; 1, grand in shape, nice head and comb, good lobes, good in shape, back and tail; 2, another good one, good comb and lobes, splendid in color, but a little too long in back; 3, another nice one, not as good in comb, lobe or color; 4, a nice one, close up to 3, balance fair. Cockerels,—16; 1, about the best Black Rose Comb Cockerel I have seen for a long time, small comb, good lobes, short on back, with a grand tail, just the right shape; 2, another nice bird, grand shaped comb, a little too large, splendid ear lobes, an extra fine tail, but he does not carry it just right, wings were hardly good enough in color; 3, another nice bird, fair comb, good lobes, good shape back and a fair tail, not as good in color as 2; 4, another nice one, fair comb and ear lobes, a little long on back, fair tail, balance of class fair. Pullets,—16; 1, was a little gem in shape, with good comb and ear lobes, fair color, good tail; 2, another nice one, but hardly as good in shape, good comb and ear lobes, a little better in color than 1; 3, another nice one, but hardly as good in comb and ear lobes, good in shape, not so good in color; 4, close up, balance of class fair. I am sorry to say that I found a great deal of white tips in the Black Rose Combs, and at a passing glance one would have thought the judge made a mistake, but if the birds had been taken and handled you would see the decision was right.

White Rose Combs: Cocks,—6; 1, nice little fellow, full of style and good color, with nice comb and ear lobes; 2, another good one, just the right type with grand head, comb and ear lobes, good shaped back, but lacked a little in tail; 3, close up to 2. Hens,—7; 1, was a neat little one, all style, nice head, comb and ear lobes, short on back, with a nice spread tail, an easy winner; 2, another nice one, fair comb and ear lobes, but not so stylish as first, carried her tail a little close together, good in color; 3, another fair one, comb not so good, a little larger, not so stylish; balance of class good. Cockerels,—9; 1, was as good as the Black cockerel, nice head and comb, good ear lobes, splendid type, with a grand tail, an easy winner; 2, another fair bird, not so good in ear lobes, hardly as good in tail, but a fair bird, 3, close up to 2, balance good. Pullets,—10; 1, was just a mate for first hen, nice little head and comb, with good lobes, short on leg, with a nice low wing, tail well spread, a little beauty an easy winner; 2, a good one, with fair comb and good ear lobes, nice short back. good color, carries her tail a little close; 3, close up to 2; balance fair.

White Cochin Bantams: Cocks, 8; 1, an easy winner, nice head and comb, short neck and full hackle, good short back with nice cushion, and tail about the right length, leg and toe feathers good, but a little creamy in color; 2, another good one, but not as good in shape as first, with a fair comb, not so short in neck nor as good in back as first, but a little better in color, hardly as good in leg and toe feathers; 3, close up to 2. Hens,—10; 1, a good one, splendid in shape, with good color, nice short neck, good back, good in leg and toe feathering; 2, another nice hen, not so short in neck as first, or as good in back; 3, another nice one close up to second. Cockerels,—5; 1, an easy winner, the best white Cochin in the class, good head and comb, nice short neck and back with fine cushion and tail carried at the right height, good leg and toe feathering; 2, another good one, but hardly as good in neck or back as first, good leg and toe feathering; 3, close up to 2; balance good.

Pullets,—4; 1, a nice one, nice little head and comb, short neck, good back, nice tail, good in color with nice leg and toe feathers, nice mate for first cockerel; 2, another good one, but hardly as good in shape as first; 3, close up to 2; balance good.

Buff Cochin Bantams: Cocks,—6; 1, wins on color, he was about the best colored bird I have seen; 2, grand in shape, but under color was very poor, also wings; 3, close up to 2. Hens,—8; 1, was a beauty, grand in shape, and right close to ground, fair color; 2, another good one, but not as good in color or shape as first; 3, close up to 2. Cockerels,—11; 1, was fair shape, but off on color; 2, another about the same as first; 3, not much different; there was not a good cockerel in the lot and the breeders of Buff will have to do better, as they are getting too much white. Pullets,—1, was a little beauty, nice short neck, and good back and nice tail, short on leg and lots of feathering, grand in color; 2, another nice one, good shape, a little too light in color; 3, another close up to 2; balance of class fair.

Partridge Cochin Bantams: Cocks,—6; a grand lot, but a little too large. 1, a nice one, good head, grand hackle and saddle, nice breast, good leg and toe feathers; 2, another nice one, about as good as first, only lacking in leg and toe feathering; 3, another good one, but not so good in leg and toe feathering or in breast. Hens,—6; 1, was a grand one, splendid color, about as good as any large Partridge hen I have seen, good shape, well pencilled all over, with good leg and toe feathers; 2, a small one, well pencilled all over, but not as good in color; 3, lacked in color; balance fair. Cockerels,—7; 1, a nice bird, good color, nice shape, good leg and toe feathers; 2, another fair one, will be a good one, but is a little too young; 3, hardly as good in color. Pullets,—6; 1, was a nice one, good color, well pencilled, good leg and toe feathers; 2, not as good in color or leg and toe feathering as first; 3, close up; balance fair.

Booted Bantams: Cocks,—3; 1, a good one, nice comb, good color, nice high tail, good back, nice length of tail and toe feathers; 2, another fair one, nice comb, short on back, fair tail, good color, not as long on tail and toe feathers as first; 3, close up. Hens,—1, a nice one, good length of neck, nice back, nice long tail, good length of leg and toe feathers; 2, another good one, hardly as long in neck or tail as first, good color, a little off on leg and toe feathers; 3, close up to 2. Cockerels,—5; 1, the best bird in the class, nice head and comb, good back, with nice long tail, good leg with lots of feathering and grand in color; 2, about as good, only lacked in length of tail; 3, another fair bird. Pullets,—1, about as good as the first cockerel, nice head, good comb, back and long tail, good leg, toe feathering; 2, and 3, both nice ones.

Black-tailed Japanese Bantams: Cocks,—4; a grand class; 1, nice head, grand comb, nice short back and the right shaped tail, with sickles edged with white up to the end, wings carried low, and short legs; 2, another about as good, grand comb, splendid shape all over, sickles not hardly as long or as well edged with white; 3, another good one, splendid comb, nice and short in leg, good tail, but a little creamy across the shoulders. Hens,—5; 1, a nice one, just the right shape for a Japanese, close to the ground, very short on back, but tail hardly good enough; 2, another good one, good shape, splendid color, close down, carried her tail feathers too close together; 3, a nice hen, good shape, but had a bad comb. Cockerels,—4; 1, a good one, splendid in color, with grand head and comb, nice short back, wings splendid in color, with grand tail, will make a fine old cock, was an easy winner; 2, fair, not so good in color as first; 3, close up. Pullets,—4; 1, an easy winner, about as good as first cockerel; balance of class all good.

White Japanese Bantams: Cocks,—4; 1, a nice one, good comb, nice neck, short back, good tail, close to the ground; 2, another good one but not as small or as short on leg as first; 3, was a beauty, but creamy across shoulder. Hens,—4; 1, was an extra good one, small close down, with a grand tail; 2, another good one, hardly as good in shape as first; 3, about as good as 2. Cockerels,—3; 1, a little fellow, with fair comb, good color and nice yellow legs; 2 and 3 both good, but off on leg color. Pullets,—3; 1, a little one, will make a grand hen; 2 and 3 both nice, but not as good type as first.

Black Japanese Bantams: Cocks,—1, a beauty, splendid in shape, with nice head and comb; 2, off on comb, and tail was in poor condition, grand in color; 3, was too high on legs. Hens,—5; 1, good shape, fair color; 2, a little better in color but not as good in shape; 3, was a little long in legs. Cockerels,—1, was a good mate to first cock, good in color and a Jap. all over; 2, fair in shape, but a little too high up; 3, close up. Pullets,—4; 1, a good one, fair color, good shape and tail; 2, another good one, not as good in shape, a little longer on legs; 3, close up.

A.O.V. Japanese Bantams: Cocks,—5; 1, a grey, I believe the best bird in the class, grand in color, splendid shape; 2, a golden duckwing, a good one, grand in shape and color; 3, a black red, grand in shape and color; there was a nice frizzled there, but it had a poor tail. Hens,—6; 1, a frizzle, a nice little bird, a good Jap; 2, a grey, a little large; 3, another fair bird. Cockerels,—5; 1, a grey, good typical Jap, nice color; 2, another nice one; 3, close up. Pullets,—1, a nice little grey, good Jap. style, good color, 2 and 3 both nice.

Bearded Polish Bantams: This was the best class I ever saw of this variety. Cocks,—5; 1, a grand one, fine crest and beard, good neck, nice back, but tail a little too short; 2, another good one, good crest and beard, back hardly as good as first, with a good pair of legs; 3, another good one, but hardly as good in crest or beard, a nice back, a little short on tail, good legs; balance good. Hens,—5; 1, a gem, very fine crest, and beard, nice pair shoulders, tapered to tail, splendid legs; 2, about as good; 3, not much difference. There was one grand hen there, but her crest was wet while I was judging. I saw her next day and I would like to have placed her. Every one of the five cockerels were fit to win anywhere. 1, was a good one, fair crest and beard and stood up nicely on good legs, nice shaped back and tail; 2, hardly as good on crest, but the making of a good one; 3, close up to 2. Pullets,—5; all good. 1, grand crest and beard, good shaped back and tail, nice blue legs; 2, not as good in crest but otherwise good; 3, close up to 2.

Unbearded Polish Bantams: A nice class, but not as good as the bearded. Cocks,—4; 1, a real polish, nice crest, good wattles and comb, good tail, blue legs; 2, another nice one, but hardly as showy as 1; 3, not far behind 2. Hens,—5; 1, a good one with a nice crest, good wattles and comb, good blue legs; 2, another good one, fair crest, good wattles, not hardly as good in shape as first; 3, close up. Cockerels,—4; 1, a good one, fair crest, nice wattles and comb, good shape on back; 2, another good one, but not as good in crest, fair tail; 3, close to 2. Pullets,—5; 1, good crest, nice wattles and comb, good neck, splendid shape, good tail and legs; 2, hardly as good in crest, nor tail shape; 3, another good one.

Brahma Bantams: Cocks,—8; 1, a light cock, good head and comb, grand hackle, nice back, well furnished tail coverts, grand color, fine leg and toe feathers; 2, hardly as good; 3, close up to 2. Hens,—13; 1, a nice one, nice head and comb, with good hackle, fair wings, with nice tail and good coverts, she seemed to be a little in the moult, as quite a few feathers were out of her back, otherwise she was a good one; 2, a nice little one with fair hackle and tail, good back, but very poor on wings; 3 and 4, close up to 2. Cockerels,—1, was the best Light Brahma Bantam I ever saw anywhere, nice head and comb, grand hackle, good back, splendid tail well furnished, with grand pair of wings, leg and toe feathers extra good; 2, another nice bird, splendid shape, good head and comb, a little light in hackle, good tail; 3, close up to 2. Pullets,—12; 1, was a good mate to first cockerel, nice head and comb, grand hackle, nice color, with an extra fine tail, well furnished with tail coverts, black right down to skin, extra good wings, fine leg and toe feathers; 2, another nice one with fair head and comb, nice back, good tail, but poor on wings; 3 and 4, close up.

A.O.V. Bantams: A nice pair of Buff Polish in old birds and a good Frizzled pullet. In cockerels there was a Black African single Comb shown, but I did not award it any prize. The owner showed it as a Minorca Bantam.

By L. G. Jarvis, Grimsby.

Polish Classes: For quality we have never seen better at any show held on the continent, particularly the White and Black. Winners grand in color with well formed crests, shown in natural condition; the first cock, the first hen, first cockerel, first pullet winning the cup for the four best birds in the show. It is not necessary for me to explain in this class why one bird was awarded the prize over another, but simply say the difference was found to be principally in color.

Black Rose Comb Minorcas: A very fine class, the largest entry we have ever seen at this show, and the quality above the average. Cocks,—1, good shape, fair comb, good color, free from purple, with deep body and great bone; 2, a good one, hardly as rich in color of plumage; others good. Hens,—1, typical shape, neat comb, good color; 2, not as good in shape, good color. Cockerels,—1, a big one, grand color, hard to beat; 2, a good one, beaten in depth of color; 3, not as good in shape of body; Pullets,—1, a neat one, wins easily in color; 2, nice shape in every section, but failed in color of wings; 3, not as good in shape.

Partridge Wyandottes: A nice entry; Cocks,—1, all Dotte, good color, hardly through moult; 2, a nice one, good color, failed to first in shape; 3, not in good shape, will show better later. Hens,—1, nice color and fair shape; 2, not as good in color; 3, lost in color. Cockerels,—1, grand condition, but was crowded by 2 won principally on condition over 2; 3, a very neat little bird, will show better; Pullets,—1, rich in color, good shape in fine condition; 2, good color, not so good in shape as first; 3, not as good in color as other two.

Dorkings: Colored not a large entry, but some good ones. First cock wins both in shape and color, first hen, a large one and in better condition than any in class. First pullet, a good one, but we doubted her age, but being informed by the owner that she was certainly a pullet, she won out both in color and shape; 2, a nice pullet, beats third in size and condition. First cockerel, all Dorking, wins easily; 2, hardly developed, will show better. Silver; a fine class. First cock, nice shape and clean in color; great bone; 2, also a good one, lost to first only in color; 3, a little heavy in color of hackle and saddle. First hen, a big one, wins in color in every section; 2, grand shape, little "bricky" on wing. First cockerel, an extra good one, but crowded by second except in color of back and saddle; 3, beaten in color; First pullet a good one, with very deep body and fair color; 2, very close, lost in shape; 3, lost in color of wings. Whites, a small entry, winners good ones.

Houdans: Not so large an entry, but some extra fine birds. First cock wins in color only; 2 cock, a trifle light in color in all sections, yet both colors were very distinct, and was crowding for first place. First hen, a large one and fair color, with nice crest and beard; 2, hardly as good in color. First cockerel, an extra good one, nice shape, very even in mottling; 2, hardly as good in shape or color. First pullet wins in color; 2, and 3, good ones.

A. O. V.; not a large class, made up principally of Anconas, one Jubilee Orpington, a few Faverolles and others.

Water Fowl: As might be expected, we had certainly a grand lot of both geese and ducks. Toulouse, an extra nice lot; 1st gander, a large one and good in color; 2nd, nice color, failed to first in shape only; 3rd, a good one, not as large as other two; 1st goose, a big one, with well formed body and in fine condition; 2nd, hardly as large as first; 3rd, not as clear in color. 1st young gander, very large and well developed, nice color; 2nd, also a large one, failed a little in shape of body; 3rd, not as large. First young Goose, a very large one and hard to beat both in color and size; 2nd, a very nice one, hardly as large; 3rd, still smaller. Embden, a large class; 1st gander beats others in size and shape of body; 2nd, very white; 3rd, lost in size. 1st goose wins in shape of body over 2nd; 3rd, not so large. Young goose, very white, fair in shape, hardly developed; 2nd, not so large, younger. Young gander, a big one, fine condition, wins easily; 2nd, younger; 3rd, small. Chinese, a few good ones, prizes awarded principally on shape. African, a nice class, shape and size decided prizes. A.O.V., class contained some Yellow and Wild Geese.

Ducks: Pekins, a large class and winners good ones; 1st drake a gem, large, well formed body with great length and depth; 2nd, another good one, hardly as large, good head; 3rd, fails to other two in size. 1st duck like first drake, hard to beat. 2nd. a very neat one, failed a little in size; 3rd, a trifle smaller, good shape. 1st young drake like first old one, I think owned by same exhibitor, hard to fault in any section; 2nd, a close one, trifle smaller; 3rd, a very good one, not so large; 1st, young duck, a typical Pekin, large, deep body and well rounded with great kell; 2nd, hardly as large; 3rd, lost in size, looks younger. Aylesbury, 1st drake, better condition than second; 3rd, not in show condition, a good one. 1st duck a nice one, could be in better condition. 1st young drake wins easily in size and shape; 2nd, a fair one, will improve. 1st young drake, nice head and bill, and beats second in these sections. Cayuga, a small entry, prizes went to color chiefly. A.O.V., a small class. Ornamental, a nice class, some extra good ones. Rouen, 1st drake, fair in color, would like to see more depth of claret on breast, and free from frosting or edging; 2nd, not as nice in body shape, equal in color. 1st duck a nice one, wins easily in both color and shape; 2nd and 3rd very good. 1st young drake, good size, crowded by second, both will show better in a few weeks. 1st and 2nd young ducks, very close sisters, a fine pair, win easily over rest of class.

By N. Cosh, Auburn, N. Y.

White Minorcas: a small class with no apparent improvement over former years. 1st cock, a large bird, off in color of wing, otherwise fair; 2nd, not so large, better in head points and rather better in color, but too short in back; 1st hen, good comb and head, nice in shape of breast and body, slightly pinched in tail; 2nd, and 3rd, lose on head points and shape. 1st cockerel, good head, nice Minorca type; 2nd, better in color but loses on shape; 3rd, good color, but lacks style; 1st pullet, good head and size and proper type; 2nd and 3rd lacks size and color.

White Orpingtons: 1st cock, and extra good one, a very blocky fellow with excellent color, has had his comb frozen off, carries his tail just a trifle high; 2nd, has good head and fair shape, very creamy in color; 3rd, stands too high up but better color than the 2nd, short in feathers as yet. 1st hen a wonderful specimen, the finest we have ever seen, true Orpington type, good comb and head, and plumage absolutely white; 2nd, another grand one, equal to the 1st in color but not in head points, nor in shape in breast or depth of body; 3rd, also snow white but fails in head and shape. 1st cockerel, good head points, plenty of size, and nice Orpington type, but not so white as we like to see them; 2nd, very similar to first, in every way, only that he stands a trifle high; 3rd, nice in head and body shape, but carries tail too high. Little to choose between the first and second pullets; 1st a trifle larger and sounder in color of lobe, 2nd, slightly better in leg color; 3rd, loses on shape.

Dominiques: 1st cock, quite a good one, but still great room for improvement in color; second, fairly good type, but lacks greatly in color and barring, better than third at that. First hen outclasses all her competitors, rather small neat head, good color and barring in all sections, especially fine in tail barring; second and third, good type, more size, but away short in color. First cockerel, nice type and better than the average in color; second, not so well developed; third also small and off in color. First pullet, fair color, ; second, very brown.

Black Javas: First cock, shown in good feather, has grand color, and is quite a good all-round specimen; second, good color but still ragged; third, off in shape of back and color of wing. First hen, nice head and good length of back and body, but not yet ready; second and third, good color, but too short in body for a good Java. First cockerel, not in best condition, but has better color and type than second and third, which are too short in the body and carry their tails too high; the remainder of class go to the other extreme, long enough in shanks for Langshans. First pullet, good all the way; 2nd, not quite as good in shape and size; 3rd, excellent color, but off in style.

Mottled Javas: First cock, an excellent all-around specimen grand in both shape and color; 2nd, not in so good condition, but quite a good bird. First hen, like the first cock, a rare specimen; 2nd, also good. First cockerel, fair. First pullet, a good one.

Black Spanish: Little to choose between 1st and 2nd, cocks. First has a greater length of face, but not so smooth as second; both grand in color. First hen better in face and comb than second and third. Cockerels and pullets quite good specimens but lack development.

Andalusians: A large class and some very fine specimens, notable first cock, a bird of excellent shape and style, quite a nice small comb, good sound face, nice in lobes and wonderful color in all sections, one of the best specimens we have ever seen. Second quite an old bird, not in the best of show condition, and showing some white in face, but superior to those under him in shape and color; 3rd, a fairly good bird with two or three others running him very close for the place. First hen quite a good bird, showing some white in face, however; 2nd, better in head points and in shape, but not equal to first in plumage. 3rd, rather short in leg, and not so clean in color 1st Cockerel, fairly good comb, splendid lobe, good style, and nice rich plumage in all sections. The remainder of the class not up to former years. Pullet class better and little to choose between the first three, but the first and second better developed in head points.

Black Orpingtons: Perhaps the finest class ever shown in Canada, and many grand specimens went without prizes. First cock, a little short in feather, yet, but a magnificent bird, with a splendid head true Orpington shape, and color as good as it is possible to have; 2nd, another grand one, not quite equal to first in head points, but good at that, with the same magnificent color and grand shape, shown in rather better feather, but just a trifle short and small for an up-to-date Orpington, a hard one to beat, however, on account of his grand finish; 3rd, another fine, large specimen, with grand shape and color, comb just a trifle large, not quite ready; 4th, grand color throughout, great size, nice five point comb, fine head and wattles, has a couple of broken flights and lacks in tail and saddle. First hen, grand style and shape, fine color, about as good as we have ever seen; 2nd, a fine large hen with grand color, fails slightly in breast and saddle shape; 3rd, much the same, but not quite equal in color; 4th, grand color, but off in comb. First cockerel, the finest we ever handled, great size, grand comb and head, an immense, deep body, simply faultless in color; 2nd, another good one, just a bit young yet, beautiful head and comb, marvellous color, good Orpington shape, just a trifle higher on legs than we like, but when fully developed, this will be scarcely perceptible; 3rd, not quite equal in color or condition to first or second, but a magnificent cockerel at that, his only fault being that he is a bit pinched in tail shape and just a shade narrow; 4th, not quite equal in shape and true Orpington type; 5th, good in shape, but fails in color, not entirely free from purple, and some grey in wings. First pullet, nice head and comb, true Orpington type, well shown; 2nd, a grand one, and in two weeks time would beat the first, grand color and type, better than first in shape of breast and body, tail not quite finished yet; 3rd, nice comb and head, grand color, but off in breast and tail shape. Quite a number of large, grand colored pullets had to be passed by, on account of comb either twisted or fallen to one side.

Lafleche: First cock, good head, grand shape and color, a good one; 2nd, loses on color and lobe; 3rd, fails in head points, size and shape. First cockerel, rather raw yet, will make a good one; 2nd, nice comb and lobes, but fails in shape of back and length of shanks. First pullet, a really nice one; 2nd, immature.

Creve-Cœurs: Just one cock bird, a good one. First hen a beauty in every way; 2nd, another good one, not quite ready; 3rd, a big one, very dull in color. First pullet, a good one.

By S. Butterfield, Windsor, Ont.

Light Brahmas: Cocks. 1st, very large and good. Coop none too large for him to straighten out his legs, he could not flap his wings, and along in same coop is first hen, and the two have to crowd one another if either of them want to even straighten themselves out; 2nd, a good large bird, but not so shapely as the first; 3rd, a very fine, stylish Brahma, but too small in size. Second hen, a little smaller than first, but rare quality; 3rd, another good one, as was the fourth, grand quality, but like 3rd, cock, on the small size. Cockerels,—1st, a rare, large, showy bird, easily 1st; 2nd, a nice younger bird, his greatest fault is ticking on the saddle; 1st pullet, a gem, with just about as good a neck, hackle and tail coverts as ever seen; 2nd, grand in tail coverts, but not as good in neck hackle as first; 3rd, another good one, a little shorter in legs than standard requires. Balance of class too young, want more development to say justly of them.

Dark Brahmas: 1st, 2nd and 3rd, cocks all very good birds, but the first was much the neatest in finish; 2nd, is coarser in some sections; 3rd, coarser still. Hens,—1st, 2nd and 3rd, all very grandly pencilled and good in size and shape, but the prize fell almost entirely on the best ground color. Cockerels,—1st, has a good ground color, very good bird; 2nd, a nice one, but much younger and will probably win over first if shown as a cock next season. In pullets, the winners won very much on the same line as the hens.

Buff Cochins: 1st cock, very sound in color and very good in under color, a little high on color of wing, and carried rather too low in tail; some parts of second were just about perfection, carried an immense body and cushion, not nearly so sound in color as first; 3rd, a very good bird, but smaller and did not carry the length of feather. Balance of class fair. First hen, a Cochin model, especially so in legs and front neck feathering; 2nd, very good in cushion and very fine in leg and toe feathering; 3rd, not very even in color, and absence of tail spoilt her show qualities. Balance of this class very good birds. Cockerels.—this class very close; 1st, a grand color, and very sound and even, rather a nice bird; second, not quite so sound in color, and when about one month older I think, would beat the first: 3rd, a nice younger cockerel than the two which won over, and he would be considered a winner if the other two were absent. Balance of the class had to give way to the development of the business. Pullets,—1st, a grand even colored bird and very sound in color; 2nd, very sound with a nice, well developed cushion; 3rd, a grand pullet, but too young for the preceding winners. Balance of class good.

Partridge Cochins: 1st cock, a good one, especially in color; 2nd, not so grand in neck and saddle; 3rd, not up to the first or second in Cochin shape. Hens,—1st, a good hen and won easily on color, although not in good condition. Cockerels,—not far enough advanced, but the three winners all seem very promising. Pullets,—1st and 2nd, better than we have seen in the last two or three years at the Ontario; 3rd, not so rich in color and pencilling. Balance of class fair.

Black Cochins: A very fine class, a litt' better than usual.

White Cochins: Cocks, very large, but not so stylish as the Buffs. 1st and 2nd hens very good. 1st cockerel a grand white Cochin, but small in size.

Langshans: 1st cocks condition made him win; 2nd in poor feather or would have won; 3rd, legs not very good. Hens,—1st and 2nd, nice sheen and good in size: 3rd, a nice shaped hen but lacks sheen. Cockerels,—1st, easy winner; 2nd, a pretty fair bird: 3rd, a very promising fellow. A real good one in this class, had to be left out for carrying his tail too high. Pullets,—1st, great in color; 2nd, a large pullet but not so neat as first on day I judged. There were two or three grand shaped pullets but they lacked in sheen or awards might have been changed. All in all a very good class.

S. C. Minorcas: First cock, a very large bird with a great comb and very large white ear lobes, about the only fault he had was a corn on his foot; 2nd, another grand headed bird but lacked considerably in head points to those placed above him; balance of class good stock birds. Hens,—1st, alone for real type of a female, and I never saw a Black Minorca hen with such a green sheen, and absolutely free from purple in every section, one of the very best I ever saw; 2nd, not so good in color as first, but a very fine hen; 3rd, should have been second had her wings been as sound in color as the two preceding ones; 4th, a grand shaped hen and good Minorca type. Cockerels,—1st and 2nd very large, very much alike, grand in shape and both carried grand tails and body shape. I preferred the one I placed first, for he was much richer in color; 3rd, a good bird a little smaller; 4th, a nice headed bird, and very even in shape, and very sound in wings; 5th, nice, both much younger.

Games, Black Red: A very heavy class; 1st cock, rather a nice, compact bird, on the small side; 2nd, a very good, all round cock, but not shown in good condition, his worse fault was too long body. A cock I would liked to have placed carried very loose high wings and a very high tail. 1st hen, a very high class bird; 2nd, 3rd and 4th hens, very good. 1st, cockerel, a very high class bird; Pullets, was a fairly good class.

Games, Brown Red: No cocks. One hen, very good. One cockerel, I wrote on his card— "A Mongrel." Two pullets, fair to middling.

Games, Duckwing: Old birds, very good, just enough to take the prizes. Chicks, only fairly good.

Games, Pyles: Two good cocks, 1st, shorter in body and carried himself nicely; 1st hen, a grand, good hen; 2nd, and 3rd, fair. Cockerels and pullets, fairly good.

Games, Sumatra: Not nearly so good as usual, especially so in females. 1st cock, had a very desirable saddle and saddle hangers. Balance of class sadly deficient in that which constitutes high class Sumatras.

Games, Indian: Very good, just enough good birds to get the awards. Class as a whole not nearly so good as last few years. One very nice cock and first, second cockereds in Old English Games were very good.

Games, A. O. V.: Some very good birds amongst them. Quality of games as a whole not up to some years.

Game Bantams, Black Red: First cock in the pink of condition, a very small bird, but very reachy; 2nd, a good bird but not far enough through the moult, not by any means at his best; 3rd, close up. One really grand cock bird in this class was top notcher, but carried much to high a tail for company. Cockerels; 1st and 2nd, I was told after judging, just out from the old country, 1st, always showing himself in just about perfect shape, did not need any stick to make him show himself, better color on neck and saddle, very free from ticking in saddle; 2nd, a grand bright bird, but did not carry himself folded up like 1st; 3rd, very reachy and large in size, a good actor, but had an extraordinarily long tail and showed considerable ticking on his saddle. Hens; 1st an easy winner for short, hard feathering none her equal, though the 2nd was not very far behind; 3rd, another good one, and one or two more good ones in the class. Pullets; 1st, a very easy winner, she had just about one fault-a little longer in body than is wanted; 2nd, a really good one, her breeder must have looked at her with a great deal of pleasure; 3rd, a nice one, close up to second. I could easily have placed six mentions in this class without any flattery, for each was of good high quality

Game Bantams, Brown Red: A good heavy class; 1st cock, grand and distinct in breast lacing and very choice in top color, and his greatest fault was his legs being placed a little too far back on his body; 2nd, a very good bird, his worst fault was that he seemed very short necked and not so distinctly laced on breast; 3rd, has been a good cock but he was not in good show condition. Balance of class only fair. Hens,—1st, a good one in fine show condition; 2nd, a grand good hen, and so was the third. Cockerels,—a good class and some of those too young to place this year will surely be among the choicest of the cock birds another season. This class was about the best Brown Red class for years.

Game Bantams, Duckwing: 1st cock, the purest in color, and a bird that it will take a good one to beat him; 2nd, a nice cock but clear in wing, shoulders showing red mixed with the orange; 3rd, much the same fault, only showed more red. Hens,—1st, rather on the large size, but a grand good hen and would help considerably any breeders' yards for she has neck, back, saddle and tail formation that good breeders so much desire; 2nd and 3rd, smaller, but they lack tail and saddle formation. Cockerels and pullets in this class were very good.

Game Bantams, Pyles: 1st cock, I understood was third cockerel last year; 2nd, another grand cock, but not showing himself full of vim; 3rd, another grand bird, not a great deal behind the first and second. Cockerels, —1st a nice acting gentleman but shorter in neck and larger in tail than first and second cockerels last year; 2nd, ran the 1st pretty close, then after those 1st and 2nd there were four pretty hard to tell which to give the preference to. Hens,—1st, an easy winner, her only fault a little higher in color than standard requirements; 2nd, a grand top-notcher, grand all over; 3rd and 4th, very high class, and as a class stronger than the males; Pullets,—1st, only had about one fault, and that was too light in breast color but the formation of body, back, tail and wings makes her a very desirable bird I like 2nd pullet even better than 1st, but she had sadly too much color, hence placed her 2nd; 3rd and 4th, close up. Pyle Game Bantam females made an extraordinary good class.

Game Bantams, Birchen: The winners were remarkably good birds, not even a middling good bird, but all high-class. Whites not as heavy class as usual, 1st cock, excepting looking large, a very high-class bird; 1st hen a good one. In the whole class there was not a poor specimen.

Game Bantams, Indian: Except for being larger than we require Bantams to be these were quite equal, if not superior to the Cornish Indian Games; remarkably fine specimens were first cockerel and first pullet.

Game Bantams, Old English: 1st cock, 1st hen were spangles and very nice and original they looked. And sure they are the young boys' bantams and may do for the babies for pets.

Bantams, Black Cochins: 1st, 2nd and 3rd cocks all very high-class and first wins over second for color and 2nd wins over 3rd in shape; 4th, another high-class bird. Hens,—1st, almost as good a sheen as first Minorca hen, very shapely and small, an easy first; 2nd, nice Cochin, lacks color of first; 3rd, a grand hen; 4th, a grand good hen. Cockerels,—1st, very green in color, very neat in head and looks like making a champion cock; 2nd, not in as good show shape as at Thanksgiving Day; 3rd, rather a hard one to beat in this class. Pullets,—1st, easy in both shape and color; 2nd, a nice one; 3rd and 4th, really good.

BY JAMES ANDERSON, GUELPH.

Turkeys: In the aged Bronze four good specimens were shown. The first prize one was an exceptionally good Bronze turkey cock, beautiful plumage, fine heavy bone, well colored legs, good length, fine full breast, fine barring on wings, primaries also well marked, in every way a first class bird The second was equal in size and weight but his plumage was not of such a brilliant bronze as the 1st one and the legs not so good in color, but he was also a grand specimen of a Bronze turkey. The others were fair to medium. In the next class there were 7 entries all good birds. 1st prize cock was very large and had good heavy bone and good clean wine colored legs and beautiful barring on his wings, fine full back and breast, and was very little behind in the weight to the two years and over birds. The second and third prize birds were also good in every way, the others were fair to medium. The next class, young cockerels, there were 13 entries and all good birds, some of them extra good, others too leggy and not so well marked. The first prize cockerel was a very fine bird and will be heard of at other shows if properly managed being well proportioned, good wing barring, fine heavy bone, and altogether the build for a first class bird, the 2nd and 3rd prize birds were also good, in fact there were very few of the thirteen young gobblers shown but will make good specimens when matured The next class was hens, two years and over; 8 very fine ones were shown and the first prize was as fine a specimen of a hen turkey as I have ever seen in my 48 years experience in the breeding of Bronze Turkeys. For weight, plumage, and good quality in every way she would be hard to beat. The second was a fine hen also, plumage grand and had she been a little heavier would not have been much behind the first. The others were all good, and were a credit to the breeders. In the next class there were 8 entries. The first hen was a particularly fine one and will make a grand show bird by another year, good plumage, good wings, well barred, and in every way a first class hen. In pullets there were 12 entries, all of good quality, in fact the show of young Bronze turkeys was very good.

In the White Holland we had 32 entries The first prize old gobler was a beauty, and had very clean, white plumage, beautiful lobes and fine length, good breast and back, the others were also good but smaller and finer in bone. In fact the White Holland turkeys seem to be getting finer in bone and smaller in size every year. We want to get some fresh blood. I am afraid there has been too much in-breeding. They ought to change their gobblers oftener. The first prize hen had fine plumage, but was not so large as I have seen them at the "Ontario" show in previous years.

In the A.O.V. class there were some magnificent Black turkeys shown and also a few good birds of the Slate variety. The first prize Black aged gobbler was as fine a bird as I ever saw, almost as heavy in the bone as a Bronze, in fact they had been crossing them with the Bronze to get the size as they are certainly finer in every way than the old Black turkeys we had years ago. The plumage may not be so jet black, but it is certainly an improvement in both size and quality of flesh, and it has done good to have given them a dash of Bronze blood which I am sure they have had. There were some good specimens of the Slate variety, and fine, large birds they are, with fine, full breast. They claim the quality of the meat is equal if not superior to the White Holland which has always been considered the most delicate and whitest meat of the different breeds of turkeys.

OFFICERS AND COMMITTEES FOR ONTARIO PROVINCIAL WINTER FAIR, 1909.

Honorary President	Arthur Johnston, Greenwood.
President	Lt.-Col. R. McEwen, Byron
Vice-President	John Bright, Myrtle.
Secretary-Treasurer	A. P. Westervelt, Toronto.

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Executive Committee.—Lt.-Col. R.McEwen, Byron; John Bright, Myrtle; Wm. McNeil, London; W. W. Ballantyne, Stratford; Wm. Jones, Zenda; Wm. Smith, Columbus; A. P. Westervelt, Toronto.

Committee on Horses.—Wm. Smith, Columbus; John Bright, Myrtle; A. G. Gormley, Unionville; W. Renfrew, Toronto; T. A. Graham, Claremont; Jas. Henderson, Belton; R. E. Gunn, Beaverton; A. E. Major, Whitevale; Jno. Gardhouse, Highfield; E. C. H. Tisdale, Beaverton; Jno. A. Boag, Queensville; J. M. Gardhouse, Weston; Wm. Hendrie, Hamilton; Dr. R. E. Webster, Ottawa; J. G. Hanmer, Brantford.

Committee on Cattle.—John Bright, Myrtle; A. W. Smith, M.P., Maple Lodge; Arthur Johnston, Greenwood; Robert Miller, Stouffville; John Tyson, Guelph; W. W. Ballantyne, Stratford; R. S. Stevenson, Ancaster.

Committee on Sheep.—John Jackson, Abingdon; Jas. Tolton, Walkerton; A. W. Smith, M.P., Maple Lodge; Robert Miller, Stouffville; James Millar, Guelph; Lt.-Col. R. McEwen, Byron.

Committee on Swine.—Wm. Jones, Zenda; Prof. G. E. Day, Guelph; G. B. Hood, Guelph; R. H. Harding, Thorndale; J. E. Brethour, Burford; John Barber, Guelph.

Dairy Committee.—W. W. Ballantyne, Stratford; Prof. H. H. Dean, Guelph; R. S. Stevenson, Ancaster; John McKee, Norwich.

Poultry Committee.— Wm. McNeil, London; A. W. Tyson, Guelph; W. R. Graham, Guelph; L. H. Baldwin, Toronto; R. Oke, London; W. Tregwin, St. Mary's; J. H. Saunders, London;

Judging Competition Committee.—Prof. G. E. Day, Guelph; A. W. Smith, M.P., Maple Lodge; J. E. Brethour, Burford; John Jackson, Abingdon; W. W. Ballantyne, Stratford; Robert Miller, Stouffville; R. W. Wade, Guelph.

Seed Committee.—G. A. Putnam, Toronto; Prof. C. A. Zavitz, Guelph; L. H. Newman, Ottawa; John Barber, Guelph; G. B. Hood, Guelph.

Reception Committee.—J. P. Downey, M.P.P., Guelph; Hon. Jas. S. Duff, M.P.P., Toronto; Hon. Nelson Monteith, Stratford; Mayor Hastings, Guelph; Arthur Johnston, Greenwood; Dr. J. G. Rutherford, Ottawa; A. W. Smith, M.P., Maple Lodge; G. C. Creelman, Guelph; John Newstead, Guelph; A. W. Tyson, Guelph; Lt.-Col. R. McEwen, Byron; J. M. Duff, Guelph; H. Guthrie, M.P., Guelph; J M. Struthers, Guelph; Chairman Reception Committee of Guelph City Council; President, Guelph Board of Trade.

Superintendent of Buildings. D. G. Hanmer, Burford.

Assistant Superintendent.—J. H. Saunders, London.

FINANCIAL STATEMENT OF THE PROVINCIAL WINTER FAIR.

RECEIPTS.

Legislative Grant	$6,300 00
Prince of Wales prize	50 00
Gate Receipts (including fees from Farmers' Institutes)	1,761 60
Advertising in prize list	440 00
Canadian Seed Growers' Association prizes	172 00
Dom. Shorthorn Ass'n. through Dom. Cattle Breeders' Association	490 00
Galloway Breeders' Association, special prizes	30 00
Canadian Ayrshire Ass'n. through Dom. Cattle Breeders' Association	53 50
Holstein-Friesian Association, special prizes	30 00
Dominion Swine Breeders' Association grant	75 00
Ontario Berkshire Breeders' Society grant	40 00
Ontario Yorkshire Breeders' Society grant	200 00
Citizens of Guelph, special prizes	150 00
Milk sold from Dairy Department	126 15
Dressed poultry sold	73 72
Swine carcasses sold	931 51
Live poultry sold in selling class	93 50
Seeds sold, 1907	4 40
Special cash poultry prizes	490 90
Prize money overpaid and refunded	10 00
Sale of Catalogues	25 00
Fees	3,065 30
Refund by exhibitors of freight and express paid	16 16
Miscellaneous	4 72
	$14,633 46

EXPENDITURES.

Balance due Treasurer, January 31st, 1908	$437 02
Directors' and Committee expenses	429 23
Judges and judges' clerks	693 60
Lecturers and expenses public meeting	196 50
Block test	132 80
Dairy test	30 00
Office help	334 02
Balance help, 1907	136 30
General help (including Superintendents), 1908	892 01
Prizes paid	8,427 75
Police services, 1907 and 1908	50 00
Printing and advertising	1,179 63
Postage and stationery	283 99
Telegraph, telephone, interest and express	85 87
City of Guelph, payment re building	260 00
Lighting building	128 98
Fuel	90 12
Cartage and rent of chairs 1907 and 1908	76 89
Straw, shavings and fittings	151 79
Feed for poultry	55 19
Dairy exhibitors' milk sold	127 15
Dressed poultry sold	73 72
Swine carcasses sold	931 51
Birds sold, sale class	93 50
Seeds sold, 1907	5 05
Freight charges advanced for exhibitors (afterwards refunded)	10 11
Auditor	15 00
Miscellaneous	13 65
	$15,341 38
Balance due Treasurer, January 31st, 1909	$707 92

Examined and found correct this 25th day of March, 1909.

(Signed) W. G. LINDSAY, *Auditor.*

(Signed) R. MCEWEN,
President.

(Signed) A. P. WESTERVELT,
Treasurer.

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.

The Show for 1909 was held at Ottawa on January 18th to 22nd. Previous to the Show the City of Ottawa remodeled the Howick Pavilion whereby splendid accommodation was made for a horse department which was added to the show. This department, as well as the other departments of the show, was well filled with exhibits of high quality. The attendance was almost double that of any previous year and visitors were enthusiastic in their appreciation of both the exhibits and addresses.

On the afternoon of Tuesday, January 19th, the show was honored with a visit from His Excellency, Earl Grey, Governor-General of Canada who also further showed his interest in the exhibition by entering some of the horses from his stables.

PUBLIC MEETING.

A public meeting was held on Tuesday evening at which the addresses following were delivered. The President of the Show, Mr. Peter White, K.C., Pembroke, presided and opened the meeting with the following remarks:

As President of the Association that is responsible for the existence of this Fair, it is with extreme pleasure that I see here what may be called the largest audience which has ever assembled in the history of the Ottawa Winter Fair upon an opening night. There are, as you are aware, a great many things to be overcome in creating enthusiasm and gathering together crowds of people to be addressed upon subjects which pertain peculiarly to Agriculture, and that is particularly usual in the case of a city audience. However, it is with a great deal of pleasure that we see each year that the audience upon opening night gradually increases, therefore we must only conclude that not only the people of Ottawa, but the farming community of Eastern Ontario are taking a very increasing interest in this exhibition, which is being made to stimulate an interest in improved methods of farming in the eastern part of the Province.

When I was asked to take the position which I now occupy as Executive head of this Institution, I told those who were urging the position upon me that it would be absolutely impossible for me to take it unless we had a Horse Show in connection. Somebody said we never could get a building, and then it suddenly occurred to someone that the Howick Pavilion was available for that purpose. When a proposition was made to the Board of Control, of which the Mayor was then a member, the plan had a no more hearty endorser and got the sympathy of no one more heartily than Controller, now Mayor, Hopewell. I am sure we can not only congratulate him in occupying the position of Mayor of the Capital City of the Dominion, but we may congratulate ourselves that this Association has in him such a true and tried friend.

Thanks to the Council of the City of Ottawa, we have a building the like of which does not exist anywhere on the American Continent, that is to say, among buildings which are designed for the purpose of holding exhibitions entirely and purely with the idea of benefiting the farming classes of the community.

We will have the pleasure this evening of listening to speakers of very great note, men who are eminent in their various walks of life, and I am sure you would not appreciate any remarks of an extended nature from me.

I now have much pleasure in calling upon Mayor Hopewell to address you.

ADDRESS.

BY MAYOR HOPEWELL, OTTAWA.

It is with extreme pleasure that I welcome your association to this city to-day. I have gone about the building looking at the Exhibition and I can say that in every respect this show is a magnificent success and I only hope that every exhibitor will go away from here with the full intention of returning next year, well pleased with the treatment he received and delighted with the whole Exhibition. My hope and my belief is that not one disgruntled person will be found when this Exhibition closes.

We have had our ups and downs in connection with this building as most of you know. It has had two or three bad falls, but I want to say that this Winter Exhibition and Fat Stock Show is not going to be allowed to fall down, at least not if I can help it. I am not given to making promises but do you know, sir, I am given to building castles in the air and sometimes circumstances do not compel me to be intensely practical, and do you know, sir, that people who never build castles in the air seldom build anything. What I have in my mind and the vision I have before me is that in another year or two at the most, we shall see the floor of this Poultry Department extended over this stage and the room increased about 25 per cent, I understand they are already cramped for room and a gentleman who exhibits poultry said to me yesterday, "We are the big end of the show." I do not know whether I should concede this or not, but I would concede this at all events,—they are the noisy end of the show.

I will not take up your time by giving a long address. It is enough for me to say I have always been and am still in hearty sympathy with this Exhibition and I think if a little more publicity were given to the Show, the citizens of Ottawa would turn out in greater numbers to patronize it. If we could only instil into the minds of the citizens of Ottawa what a magnificent asset we have in this Exhibition and in this building, I am sure they would take great pride in it. I am not always sure that the best way to gauge the value of anything is by the money returns. This Exhibition is an educational factor and increases educational facilities in this country and in this way it is one of the best institutions and best assets that the City can have. I think the more intelligent the rural population becomes the better it is for the City and I hope this institution will become more and more an educational factor, educating the population of the rural district to produce better live stock and poultry and to develop our farmers in intelligence and integrity. I think if we measure the success of this institution in that way, we will have to admit it is a great asset to the City of Ottawa.

On behalf of the citizens of Ottawa, I bid you welcome. I hope that everyone who comes here will go away with the impression that Ottawa is willing to spend the money on the education of the people and that in this show you will have found ample room to develope it and that you will get here an education that you could not get elsewhere.

I thank you for the honor of asking me here to-night to bid the strangers welcome to the city and I think I may as you request, offer you the freedom of the City of Ottawa. I have no doubt that none of you will take advantage of this offer to missuse the privilege. I am an old County of Carleton boy myself and I have confidence in the people in the surrounding district and therefore I offer you without any restriction the freedom of the City.

ADDRESS.

By Dr. R. A. Falconer, President of the University of Toronto.

You may think it strange that I have travelled all the way from Toronto to-day, and have to return again to-night in order to take up the incessant duties of the University to-morrow morning merely for the sake of saying a few words to you at the opening of this show, and yet, when Mr. White wrote me, although at first I was reluctant because of the pressure of duty to leave home, I felt on further consideration I should certainly make an effort to come, and now that I am here I am very glad that I have been able to come. The glimpse I have had of this show is not sufficient, of course, for me to pass any encomium upon it, and yet as I came through the building I was particularly struck by the fair appearance of the buildings, and I hope I am justified in believing that the things that are contained in the building are of the same high order as the place in which they are housed.

There are several reasons why one is anxious to come to this gathering to-night, and the first is because I believe in the University. We must show the people of the Province that we are able to do something for them, that we are their University and that we must come into touch with them in as many ways as possible.

You ask in the first place, How? Well, of course, you support the University very generously. The Province is giving us a large amount of money. Who are the people who come to the University? They are your sons and daughters. Probably we have some sons and daughters of men and women who may be sitting in these seats before me. Two-thirds of the students of our University come from outside the City of Toronto; it is a Provincial University. These people come to us from all over the Province. What do they come for? I am not going to keep you too long on this subject. They come, we believe, from your homes in order that they may be fitted to go back into this Province and into this Dominion and be better citizens and be able to contribute to you and your homes something that you would not otherwise have. They should leaven the whole surroundings so that by reason of their having had the advantages of a University education, the situation in our towns, in our villages, and in our country-side, may be constantly getting better and better. They should add interest to the life in which they live, they should bring in new ideas, and they should give you something of these things that they themselves have received.

We send out lawyers, but not so many lawyers, because they come from Osgoode Hall; they get their degree from us. We send out doctors, engineers, and men into every profession, the ministry and teaching, and almost into every department of life; and more and more the work that we do in the University, is work that comes home directly to the people of the Province.

You say that you have no son in the University or no relative, and that you do not expect ever to come into touch with it; but every time that you entrust yourself to a doctor's care you are really relying on the kind of teaching that is being given in these centres of education. Every time that some great building is put up, it is put up by the skill of men who are educated in these centres. Every time that you travel in a railway train you go along a track that has been laid bv men who were educated at these centres and who know how to lay railway tracks. The better doctors you have and the more skillful engineers you have, the safer is your life, and the more comfort and the more security can you feel. So you cannot simply brush the great University aside and say, "I have nothing to do with it." It is bound to come home to you. More and more is this becoming the age of experience. You are trusting yourself and your safe keeping to the people who are being trained as experts, and you should be proud that your money which is being put into the University has greatly improved every side of our professional life.

It is from the farming population, not only in this Province, but in all the Provinces that we get the largest proportion of our best students. I am safe in saying that. That has been an old experience. You can question students of almost any University in this Dominion and you will find that it is the quiet, strong, intellectual moral homes out in the country, where the boys have had to be alert, where they have had to do work, where they have had to adjust themselves to new situations, where they have had to get what they have got by their intelligence and by their toil, where they have had high ideals,—it is from these quiet, strong, healthful homes that the towns are recruited, that the cities are recruited, and especially that the Educational Institutions are recruited; so that every President of a University should feel most thoroughly at home among a gathering of men and women who are directly associated with Agriculture.

That leads me on to say I feel a pleasure in being here to-night, also because I am persuaded that the well-being of this Dominion will depend in the future very largely on the quality of the men and women on the farms throughout the country. I am not saying anything that I do not absolutely believe. We may think a great deal of our manufacturing; I do value highly our manufacturing. We may think a great deal of building large cities; it is desirable that we should have certain large cities, but not too large. I hope we shall never have tremendous cities; cities of moderate size would be far more healthful. We ought to have good towns and people must congregate there, but unless behind all that there is a great body of people living on the land, living in comfort, doing their daily work there, thinking hard and living moral lives, then woe to us in the cities and in the towns.

In the cities wealth develops fast. Only wealth? Not by any means. Wealth and poverty; the two go together. Great manufacturers do you say! Only splendid articles turned out? No, you see the droves of men and women coming out at the lunch hour and coming out in the evening, bent with their toil and pale with their work, shut in as they have been day after day, working hard for a pittance, many of them. That is what you see. Manufacturing is necessary, but manufacturing has its drawbacks. For health, strength and time, where do we go? You go to the country, to the open air, where you can see the blue sky, where you have a large space over which you can roam, where you have a roomy house in which you can live, where you never fear lest you shall be in want. You do not know what want is in the country. It is from the country that comes much of our stamina and our strength and unless we have these the town population will by no means equip us for the problem which lies before us as a people.

Therefore, it gives one a great pleasure to come and address a body of men and women whose life is on the farm, out in the open, who work for what they get and who are free from the dragging cares of the city. That is a healthful life, and breeds healthful, strong men and women.

Another reason why I am glad to be here is this; This is an educational place. Here a body of people are being educated. What does education mean? Education is not cramming in a lot of facts. You have met a great many people who know everything, and they leave no impression on you at all; they can tell you everything but what you want to know. A large amount of unrelated information lies around about them. That is not education. An educated man or woman is a man or woman who has his or her powers so developed that he is able to use them in the best way possible. There are different kinds of education. There is the educated minister, the educated doctor, the educated engineer, the educated lawyer, the educated mechanic and the educated farmer. The same kind of process is not used in all cases. One kind of education or training brings out one type of man. The man studies his professional work, but in every case true education is supposed to develop the powers that each one has.

Education should mean this: That you and I have studied what we can do, and have bent all our energies to do it, and are growing more able to do it every day. A man's education does not stop until he is dead. He is a dead man if he has stopped growing; he is a useless man, she is a useless woman, unless he or she has learned a bit more every day and is a little better fitted for the work in which Providence has placed them and set their lives. So I look upon a gathering of this kind as educative. How? It directs your attention into ways in which you may develop. You know if you put a good farmer into a community he is of educative value, not because every man copies him, but because he stimulates every man to ask himself, "What is the difference between us, why cannot I do what he is doing, or rather, why cannot I do something better than what he is doing?" Not a case merely of imitation, but a case of development through example.

You see around you examples of what may be done. I am perfectly persuaded that as you look back over the history of Ontario you will discover that the population of Ontario has gradually been going up and up. Why? Largely through educative ideas that have been penetrating into the minds of the people on the land.

The College at Guelph, with which Dr. Mills was so long connected, has had a vast influence in that way, and the farming population is seeing something beyond what they had dreamed of, and every opportunity of this kind is an opportunity for men to grow, even it may be, if they are in middle life.

What are we aiming at as a people? Well, I think three words in a motto of one of our cities of Ontario may be fitted in here well to show the aim and purpose we should set before ourselves. We should aim at Industry, Intelligence and Integrity.

Industry. In our farming population there is plenty of scope for Industry, and I should not say that by any means in Canada we lack Industry; in fact, I often believe that the rigorous climate in which we live and the necessity of our always having to work here for what we get, has given us vigor and power over other people who live in milder climates and in the countries which do not require the same effort for production. I lived as a boy for a good while in the West Indies, and I know how rapidly things grow there and the productivity of that soil; but I am absolutely certain that we who have to strive and struggle in order to get our results, are developing strength of manhood and energy that the people who are in the south can never get. I am absolutely certain that the future belongs to the people of the north. Although we may think our winters are hard, although in the morning it is difficult to get up and dress in this cold, and we shudder and wonder when March will be over and April begin to show us a sign of fine weather, yet all this cold has toned us up and given us strength and power and energy which have entered into our manhood and which must tell in the long run.

I believe then that the very environment in which we are situated is a splendid thing for our future, and that we can rely upon it that we are going to develop in Industry, and that strength will be ours. Industry, then, should be our motto. It is astonishing, how soon the result is manifest if we do things regularly and in order, if we put our best into our daily work. How quickly the whole tone of this Province has changed. If you go to sleep and wake up like Rip Van Winkle, even aften ten years, you will be astonished at the growth there will have been of intelligence and industry.

That leads me to the second remark, that mere industry is not sufficient. Along with industry we must have intelligence, and the farming population of this country are growing more intelligent. I believe taking them as a whole, there is no part of our population more intelligent, but also that intelligence must develop. Men and women must think; it is thinking power that makes us what we are. It is when we stand and consider and ask, "How are we to do that thing?" It is as we do that we begin to grow and get intelligence, and intelligence behind power makes a vast difference.

I have of late been reading over again the story of the war down South of 1860-1864. I have been reading the letters of General Lee, that genius, the great general who in spite of his misfortunes, has left such a marvellous record behind him; also the life of Stonewall Jackson, his able lieutenant, and I have been looking with a vast amount of interest at the way in which these two men inspired their soldiers; how, when small in number and poorly equipped these men were able to hold at bay the immense armies of the North, armies that multiplied their own several times, armies better equipped and with far vaster resources. Why was it? It was because the armies of the South had two men of genius. It was not the multitudes of the North that conquered; it was not that immense mass of power. What did these men of the South do? Lee and Jackson would watch and there would be some great general of the North coming down with an army twice their size, a boaster perhaps like General Pope, who told his men what he was going to do, how he was going to annihilate these men of the South; but Jackson, with his small band of men, knew the ground and knew the man he was opposed to, and before Pope realized it Jackson was away in his rear and had burned up all his stores and cut his communications, and the first Pope knew of it was the smoke in the distance. Then off Jackson went and escaped as this lumbering army came after him. What was the difference? Not the difference in power, not the difference in energy; the soldiers of the North were just as strong as the soldiers of the South; it was a difference in intelligence. You may depend upon it to the end of the chapter that it is not the man with the great strong right arm only, who is going to win victory, but it is the man who stands and thinks. The farmer who stands and thinks for a while and grows in intelligence, is going to get things done on his plot of land that another man may spend a fortune on to get done, and they will not be done nearly so well. So work intelligence into industry. It is from that intelligent population that the life of our community as a whole will be recruited.

The last idea which I wish to leave with you before I sit down is this, that along with intelligence must go integrity. That was the third word in the motto, and integrity is equally valuable with the other two. We need the type of man who can be depended upon and who is not so foolish as to think that if he goes on cheating, he won't ruin his character. It requires a great deal of intelligence to get into some people's heads that it is as true a fact as can possibly be that lack of integrity and doing under-hand, mean things will bring evil consequences in trade just as certainly as the sun rises in the morning and sets at night.

Integrity in farming is one of the things that we need from side to side of this Dominion. I am not casting any slur on the farming population, but certainly if we can only get our name through the length and breadth of the civilized world on such a high pinnacle that wherever Canadian stuff goes it goes with the reputation that can be trusted, then we shall have a national asset second to none. We have something that will be relied upon and the future of our nation will be assured. Certainly it is from homes of that kind that we shall have a never ceasing stream of men and women who will build up our country.

How many of us have known old men and women who, in their spare hours turned their attention to great books and read and thought? How often have you been surprised at the outside of a man, but you have by a little talk discovered that there is really a great man hidden away there. He is perhaps in some little house. What did this great man do with his spare time? He used it, he thought, he read. Did he come to much? No, not very much. What about his son? Why, his son may be a Judge in the Supreme Court here for all I know, or his son is down in Toronto, or he may be over in England or in India or China. It was the old man back there of whom the world knows nothing, who sat still in his home and read his books from whom the sons came. Men and women unknown, building up strong lives of integrity, intelligence and industry, are preparing these people for us.

There is one fear that I have and that is this,—that as times are so good, and prices so high, the farming population may begin to think that success in life has to be measured by the number of acres, even the brick buildings in which men live, and by the barns and stock. The danger is lest we should forget that, after all, good as these things are and much as we look forward to increasing comfort in this country, there are bigger things behind, and the biggest things on the farm are the men and women who live in that house, and the boys and girls who go to school. Bearing this in mind, at the same time as our material comfort is developed, our true manhood will grow, and as Canadians we shall be a people who will be represented in the councils of the earth. As our great Milton said, "Virtuous education makes the bonds and the ligaments of the commonwealth." It binds the people together and makes them strong. Virtuous education among the people based on industry, intelligence and integrity is the pillar on which our constitution rests.

ADDRESS.

By James Mills, LL.D., Ottawa.

I was glad to receive an invitation from your President to be here this evening to hear Dr. Falconer and other distinguished men address you, including our Minister of Agriculture and Senator Derbyshire, who is so well known throughout the eastern part of the Province,—in fact, all over the Dominion.

What can I say to the people assembled here? When I come into a gathering such as this, I cannot help saying to myself: "These are my people." I know the farmers of Ontario pretty well; and whenever I meet them, I have a different feeling from what I have when I meet any other class of our Canadian citizens.

I am glad to have an opportunity of appearing before a number of the representative live stock and poultry men of the eastern part of the Province, and some from the central and western part of the Province as well. I congratulate them on what they have done for themselves and for the country at large. I think a show of this kind has great educational value, especially for young farmers. I agree with Doctor Falconer that no class of people needs education more than the farmers; and I appeal to the younger men here this evening—and I am glad to see that perhaps the larger portion of this audience is made up of young men and young women—I appeal to them to buckle down to the work and let nothing escape them. I have had a motto before my mind for some years, and I want them to consider it carefully: "NOT WELL ENOUGH, BUT THE BEST POSSIBLE IN EVERYTHING."

The average man as a rule is not a great success. We want men who are determined to make their mark in some line. Take this thought home with you,—in the cultivation of the soil; the selection of seed; the growing of crops; the selection, breeding, feeding, and care of live stock—cattle, horses, pigs, sheep, poultry, etc.;—and in everything else to be done on the farm,—"Not well enough, but the very best you can do."

Such a motto should be adopted by dairymen as well as by the men who are raising horses or breeding and fattening cattle, sheep, and swine. The man or boy who works according to the wages he gets, will never get high wages; but the man or boy who does the best that is in him, regardless of the wages, will ultimately become a leader in the community.

We may congratulate ourselves on the fact that the President of our great Provincial University has thought it worth while to spend an evening with us; and I congratulate the directors of this Eastern Show on having at their head a University man, Peter White, B.A., who is not only a scholar, but a successful farmer,—a breeder and feeder of cattle.

I ought not to occupy a minute more of your time, because we have with us the Minister of Agriculture for Ontario, whom we are all anxious to hear,—a man from my native place, the noted County of Simcoe.

"Not well enough, but the best possible in everything."

ADDRESS.

By Hon. J. S. Duff, Minister of Agriculture, Toronto, Ont.

I am pleased indeed to have the privilege of being with you to-night. Apart from the interest I have taken in this Show, apart from the fact that I am glad to be here on account of the Show, I am glad to be here to have had the privilege once more of listening to Dr. Falconer, President of the Toronto University.

It was my privilege a little over a year ago to hear Dr. Falconer address a very large audience of farmers and their friends in the City of Guelph, and the thought came to me then, and it has been more forcibly brought home to be to-night, that this is the sort of thing we want if we are to become a great country such as our resources warrant. We have not had in the past the community of interest between the university people, the city people and the country people that should prevail, but this Show which is such a success in the City of Ottawa is perhaps doing more to bring the people of this great City of Ottawa more closely in touch with the agricultural interests of Eastern Ontario than anything that has occurred for some years.

It appeared to me, after having gone through this Show that apart from the interest that the agriculturists may take in the Show and apart from the interest those who have gone to a great deal of trouble to bring these exhibits here and show them in the splendid manner that has been done, apart from all that, the people who are really the most benefited and who should show their appreciation of the efforts of the exhibitors, are the people of this beautiful City of Ottawa. What would the City of Ottawa or any of our cities be were it not for the farmers? If the people of the cities are to have that appreciation of their work which they expect from the people of the rural communities they must in turn understand that the rural communities will expect some appreciation on their part of the work being done by the agriculturists.

We have had the pleasure to-night of listening to Dr. Mills, a gentleman, who, perhaps, has done more for the benefit of the agriculturists of Ontario than any other one man, at least during a generation. From an agricultural standpoint no greater tribute could have been paid to us than the fact that when he left the Presidency of the Agricultural College at Guelph, he was transferred to a somewhat higher sphere, to a sphere in which he certainly can do as much for the agriculturists of Ontario as in any position he has yet occupied. I think it was a splendid tribute to the agriculturists of the country, because you know there has not been that feeling of good-will between the farmers and great railroad corporations that we would like to see exist. We feel satisfied, however, that in the person of Dr. Mills we have at least one man on the Railway Commission who will do what is fair and right between the corporations and the farmers who have business with them. He is discharging one of the duties that is a necessary part of that community of interest which must exist between farmers and the citizens of our towns and villages if we are to be the contented and prosperous people that we ought to be.

I wish to express the great pleasure it has been to me to go through the Show and see the exhibits. The President of the Show and those who have been associated with him are to be congratulated on the success they have attained, because they have had an up-hill fight in endeavoring to establish a really good show in the eastern part of the Province.

Many people who come here simply to see the Show without the expectation of being especially benefited will find themselves wondering how the different exhibits were bred, cared for and fed to bring them to such a degree of perfection; they will watch the awards being made and hear the reasons of the judges for placing the animals as they do; they will listen to the practical addresses to be delivered in this Hall and then each one should feel determined to do better things.

Unless all our fairs, from the National Exhibition held in the City of Toronto down to the smallest fall fair in this Province, are of an educational value to the sections in which they are held, then they are held in vain. What is the use of bringing exhibits together unless it inspires our people to go on and do better? It we are to be true to the trust reposed in us, and if we are true to the position in which we find ourselves owing to the integrity, intelligence and hard working industry of the pioneers who came into this great Province of Ontario if we are to be true to our traditions, then we must, after this Show is over, go home determined in some way or other to be better farmers and to raise better live stock.

I wish to say that the gentleman who have had the honor to represent the people of this Province in the position which I now occupy since we first had a Minister of Agriculture have been imbued with the idea of giving the best in them, according to the means at their disposal, to help the agricultural industry of this Province, whether it was Mr. Drury, Mr. Dryden, or my immediate predecessor, Mr. Monteith. However, we may fight each other when the elections are on or however we may line up in battle array, when the party call is sounded, once the elections are over we forget the partisanship and are imbued entirely with the idea of doing that which is best in the interest of the whole community.

I wish to congratulate you, Sir, on the great success that has attended your efforts in the holding of this splendid fair.

ADDRESS.

By Senator D. Derbyshire, Brockville.

I have been particularly pleased to see we have a larger audience this year than we had last, and I am sure you must be all very much gratified with the addresses which you have just heard. I have been highly pleased with the head of our educational institution in the Province of Ontario. I am sure it augurs well for the Province of Ontario that we can get men such as Dr. Falconer to come and speak to the farming community and give them ideas about what ought to be done in connection with extending our education.

I was more than delighted with Dr. Mills. I have always been an admirer of his. I remember attending the Agricultural College and hearing one of his addresses, and I went home at once and packed my boy off to the Guelph College so that he would be under that man, so that he would make him useful in this world, and I am sure I have never regretted in the least having sent my son to the Agricultural College.

If we could only get the young men to go to the Agricultural College so that they could take their place as trained agriculturists the same as doctors take their places, the lawyers and other professional men! Why not have these men on the farm trained for the work that they have in hand so that they can intelligently take hold of this work and press it forward with more intelligence and greater zeal than ever in the past. You know we have these lawyers stumbling around and starving in the cities, and these ordinary ministers of the Gospel that cannot preach a decent sermon if you would give them all the world. We have men in the professions that were never adapted for the business, and if we could only send them to the Guelph College and train them for business that they could do, if Dr. Falconer, who is president of our big college in Toronto, when he sees a man not adapted for the profession would say to him, "You go straight home and take hold of the plow, do not sit around here; you never can do anything in the professional life," and he would get him back on the farm, it would be a great deal better. Men are tumbling over one another to-day into these high positions, but there is no place like the farm. I would like to know what business would be more instructive to any man to-day than making two blades of grass grow where one now grows, by using more intelligence, and by making two grains of wheat grow where one now only grows, by selecting the seed, picking the big heads and intensely cultivating the soil.

You can find in every factory where they are sending milk in Eastern Ontario that they have men who are sending $70.00 worth of milk per cow to the factory in a season, and there are men in that same neighborhood, their milk drawn on the same milk wagon, getting only $14, $16, $20, and $23 per cow. What is the matter? It is because they do not put intelligence into the business. There are men who are feeding cows and those cows never pay them for their feed. The weakest point of farm practice in Eastern Ontario to-day is the fact that the farmers do not give their farms sufficient cultivation; they do not preserve the fertility of the soil and keep the farm in such condition that it will grow bigger crops, and they have not grown the feed to feed their cows in the summer time let alone in the winter time; they have starved the cows, half the time they have not given them sufficient water and they have not put them in proper stables.

There is no time in the history of the world that milk is worth as much as it is to-day. Why are you standing behind a dry cow when that cow ought to be giving good milk for 10 months in a year? Take home these practical thoughts and see if you have not a boy you can send to the Agricultural College.

Two-thirds of the cheese made in the Dominion is made in Eastern Ontario, because we have the best class of people in Eastern Ontario that they have anywhere in the world, and I am glad to see the Minister of Agriculture down here to get an idea of the kind of people we have in Eastern Ontario. We want men to get out among the people and make-themselves useful and just as they get in touch with the Agriculturists of this country; just so useful will they be to the people of this Province.

LECTURES ON PRACTICAL SUBJECTS DELIVERED AT THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.

THE PASTEURIZATION OF WHEY, ITS EFFECT ON THE QUALITY OF THE CHEESE, AND ON THE FEEDING VALUE OF THE WHEY.

By H. H. Dean, Professor of Dairy Husbandry, O.A.C., Guelph.

Several problems are now pressing for attention from the owners and patrons of cheeseries. For instance, an English correspondent of a Canadian trade paper recently said: "It is not to be denied that the business of exporting cheese from Canada, and importing into Great Britain, has been a losing game for those chiefly engaged in it, and the only people who have benefited in the business are the Canadian farmers. No one is going to quarrel with their view of the situation; . . . but the trade has now reached a stage when it is becoming a question as to whether it is worth while importing cheese at all, the results of the distributive trade on this side, at any rate, being so disappointing, and the Canadian exporting side of it also being unsatisfactory."

The writer goes on to warn "The Canadian" that "New Zealand" is becoming a formidable competitor; that they have a large make of English cheese and that the British tariff is likely to be changed shortly to the disadvantage of the Canadian farmer. "These are points it is hoped your farmers will take into serious consideration."

The editor, commenting on the foregoing letter concedes, "that there has been very little profit of late, in shipping cheese to Great Britain." He further says, "It is also well known that the farmers of Canada have reaped the greater benefits through undue competition amongst the middle men, which left scarcely any margin for themselves."

The editor goes on to say that fall cheese ought to be purchased at "the lowest prices for one year, in order to insure profit" owing to the fact that the goods have to be carried for some time." His remedy is—"compel the farmer to carry the cheese, the same as hay, grain and other produce, so that shippers could fill their orders from stocks held by farmers in storage here, or wherever most convenient."

We have no time to argue the case at present, but would say, that it can easily be proved that the Canadian farmer has not been reaping undue profits from the cheese business, in fact, has scarcely been receiving bare interest on his investment and living wages for his labor.

Regarding the suggestion that farmers carry their fall cheese, we think it a good one if the farmers would do so and deal directly with British importers it would mean considerable more profit for them. Marketing problems are among the most profitable studies of the farmer. There are too many persons taking a slice of the profits of the producer, which also adds to the burdens of the consumer. Middlemen are killing the goose that lays the golden egg.

Other problems for the cheese men are, the manufacture of whey butter, and how to meet competition from town and city milk trade and from the milk condenseries.

We shall not discuss these questions at the present time, but take up somewhat in detail the problem of—

The Pasteurization and Feeding Value of Whey.

It may be well at the outset to explain what is meant by pasteurization and also what we understand by the term, whey.

Pasteurization means heating of a liquid (in this case whey) to a temperature of 140° F., to 185° F., and afterwards cooling the liquid. The term is derived from the name of a noted French scientist, Louis Pasteur, who devised the process known by his name. The object of pasteurization is to free the liquid partially or entirely of germ life. This is accomplished by means of heat—preferably moist heat, such as steam. Time and temperature are important factors in destroying minute plant life known as bacteria. A temperature of 150° F., to 160° F., for several hours, such as is the practise when pasteurizing whey, is as effective as a higher temperature for a shorter time. If the whey tanks are kept reasonably clean and are covered so as to retain the heat over night, the patrons ought to be able to obtain practically sterile whey the following morning. This means that the danger of spreading bad flavors to the milk or disease germs to stock on the farm through the medium of the milk cans, where whey is returned in them, is reduced almost to the vanishing point.

By whey, we mean the by-product, or what is left from milk after the rennet has coagulated or curdled the casein enclosing most of the fat contained in the milk, some of the other milk solids and a proportion of the water of milk. The feeding value of whey is largely found in the fat, and solids not fat. Of the latter, the chief constituent is milk sugar, which when milk sours is changed into an acid, known as lactic. While the latter has little or no direct food value, it seems to exert a beneficial effect upon food digestion in older animals. For young stock, however, the dairy by-products are more valuable without the lactic acid. In tests made at Western Ontario factories, it was found, that whey unpasteurized contained from 1 to 1.7 per cent. lactic acid, whereas whey pasteurized, contained but .4 per cent, acid and in some cases as low as .25 per cent.

There is another beneficial effect of pasteurization in that it prevents the fat separating from the other solids and the liquid, thus insuring an even distribution of the fat contained in the whey among all the patrons and preventing that greasy mess in the whey tank, or in one or two patrons' cans, which is an abomination to those who have to wash tank or cans.

During the season of 1908 we conducted rather extensive experiments at the O. A. College regarding the whey butter question, details of which can be found in the Annual Report of the College. In conjunction with the Animal Husbandry and Farm Department, we carried on a series of experiments to ascertain the relative feeding values for hogs, of whey containing an average of about .25 per cent. fat, and similar whey from which the fat had been practically all extracted by means of a cream separator.

Professor G. E. Day has kindly furnished the following summary of the results with pigs: "Eleven pigs were fed ordinary whey and meal; ten pigs were fed separated whey and meal; and twelve pigs were fed water and meal as a check group. The experiment lasted 120 days.

On ordinary whey, the average daily gain per pig was 1.16 lbs.; for separated whey, 1.097 lbs.; and for meal alone, .7 lbs.

The feed consumed per 100 lbs. gain for ordinary whey was 269 lbs. meal and 747 lbs. of whey. For the separated whey it was 297 lbs. meal and 774 lbs. whey. For the group fed meal alone, it required 430 lbs. meal.

From these figures we deduce that if the value of separated whey be represented by 100, the value of ordinary whey would be 125, or 25 per cent. higher.

I may say that in this experiment, we found an abnormally high feeding value for both kinds of whey, and the only reason I can give for this state of affairs is that we fed a very small proportion of whey to meal. On an average we fed hardly two and three-quarter pounds of whey for each pound of meal, and it is a well known fact that where small proportions of dairy by-products are used, they give a much higher feeding value per 100 lbs., than when they are used in larger quantities. As whey is ordinarily used, a much lower feeding value per 100 lbs. would be obtained. In our experiment, however, we were anxious not to have any of the pigs put off their feed, and consequently we kept the whey down in quantity. Though the results show a higher feeding value for whey than normal, at the same time, I think that the method of feeding should not affect the comparison of the two kinds of whey."

Difference in Value per 100 lbs., of Ordinary Whey and Separated Whey.

Assuming that live hogs are worth $5.50 per 100 lbs., and that the meal cost $1.50 per 100 lbs., we have a value of 18.2 cents per 100 lbs., for ordinary whey, and 13.4 cents for whey from which the fat has been extracted, a difference of 4.8 cents per 100 lbs. in favor of the whey containing the fat.

This means that in a factory where the fat is separated from the whey, or where the fat rises to the top of the whey in the tank and is practically lost for feeding purposes, that the loss in feeding value is nearly five cents per 100 lbs. whey.

Looking at the whey butter question for a moment and taking the average of experiments made at the O. A. College during 1908, where the amount of whey butter made, averaged from 2½ to 3 lbs. per 1,000 lbs. whey, we can see that whey butter must sell for an exceptionally high price to give any profit. Assuming that the yield be 3 lbs. butter per 1,000 lbs. whey at 20 cents per lb., we have a value of 60 cents. According to the pig feeding experiments quoted, the difference in feeding value of ordinary and separated whey is 48 cents in favor of the unseparated whey, or only a margin of 12 cents per 1,000 lbs. whey for making the butter. As the price of the butter increases, of course the margin is greater, being 27 cents per 1,000 lbs. whey, if the butter sells for 25 cents per lb., and 42 cents if 30 cents be received for the butter. These facts may very well cause farmers and factorymen to consider carefully whether or not it pays to manufacture whey butter.

The estimated cost of pasteurizing whey at the cheese factory is from 50 cents to $1 per ton of chese. Considering the enhanced feeding value of the whey, the reduction in risk of spreading bad flavors and disease, and the greater ease with which the tanks and cans may be cleansed, we strongly recommend the cheese factory managers of Eastern Ontario to make the necessary provision for pasteurization of the whey during the season of 1909.

Effect on Quality of Cheese.

While the effect of pasteurization of whey upon the quality of cheese must be largely speculation, because no exact experiments have been made, we may reason that the effect will be an improvement. In Western Ontario the "bitter-milk" flavor and other undesirable flavors have almost entirely disappeared since the factories began pasteurizing the whey. This in itself has been of sufficient value to pay the cost of heating the whey. Owing to the increase of injurious bacteria in all our cheese factory sections, the problem of how best to control these becomes an exceedingly important one, and one which grows more important each year. The whey makes an excellent breeding ground for all low forms of life. Where the whey is returned to the patrons in the milk can, which is the common practice, and where the cans are not properly washed, which also is all too common, we can readily see, that infected whey means infected milk, which means poorer quality of cheese. A cheese maker cannot turn out a finished product superior to the raw material (milk) which is delivered at the factory.

To sum up, pasteurization of the whey means whey of greater feeding value and an improved quality of cheese.

Q.—Pasteurizing is quite sufficient, you would not recommend sterilizing?

A.—No, it is not necessary to sterilize because where the whey is heated for this long time, it practically sterilizes it, although we do not adopt the temperature that is really necessary for sterilizing.

Q.—After it is run out, you immediately heat it up to this 160°?

A.—Just as soon as the vat is dipped; our whey is now 98 to 100 degrees. If we allow it to stand some time it will cool, therefore it is better to commence to heat at once and take advantage of the high temperature just as soon as the whey is run off.

Q.—To sterilize you have to heat 212°?

A.—Yes.

Q.—The added expense would be for the fuel?

A.—The chief expense is the fuel. It would also depend to some extent on the distance your whey tank is from the boiler. A three-quarter inch pipe to the tank and the extra fuel needed to furnish steam is practically the whole expense.

Q.—What quantity of coil do you require around the vat?

A.—A three-quarter inch perforated pipe across the tank would be sufficient. I do not think it is necessary to put a coil around the tank. Most of the factories simply have a pipe going across the middle of the whey tank. There are other methods; in our own case we pasteurize all our skim milk and we use the exhaust steam from the engine. Where you use an engine you can utilize the exhaust steam. In our case it costs us practically nothing to pasteurize the skim milk, where we have an engine at the factory. If you send to the Department of Agriculture in Toronto you can get bulletin No. 143, which will give full instructions as to the utilizing of exhaust steam for pasteurizing purposes.

Q.—What is the feeding value of ordinary whey that comes from the factory?

A.—A great deal would depend on the price of pigs, etc., perhaps from 5 to 10 cents per 100 lbs. In our estimate we got 18 cents from the sweet whey, but that was rather high feeding value.

Q.—You say the value of whey not pasteurized, is 5 to 10 cents per 100 lbs.

A.—That is the estimated value.

Q.—You say that pasteurized whey may be worth 18 cents?

A.—We got that out of this experiment; I do not say that is the commercial value of sweet or pasteurized whey, but in this special experiment, we got that value, because we fed it sweet, which is much the same as if it had been pasteurized.

Q.—You got a value of 13 cents without pasteurizing?

A.—No, 13 cents where the fat had been removed; that is the same as where the fat rises on the tank without pasteurizing it, thus reducing the feed value. Pasteurizing keeps the fat distributed all through the whey.

Q.—You think the whey should be pasteurized every time?

A.—Yes, where the whey stands over night in the tank.

Q.—What is the difference in the value of the whey on top of the vat and in the bottom?

A.—If a lot were all taken from the bottom, it would make a difference of about five cents in the 100 lbs., because in the ordinary whey tank, the fat has nearly all risen from the whey in the bottom of the tank. The man that comes first gets very little fat; he gets the worst of it.

Q.—Would it not be better to stir that whey tank?

A.—Yes, it would be better, but it is difficult to get the fat mixed in, when it has cooled.

Q.—Will the whey keep after it is pasteurized?

A.—Yes, it will easily keep for twenty-four hours. The pasteurized whey returned to the farmers on the following morning has little or no more acid than when it was run off the vats the previous day, it practically remains stationary and the reason for that is, that the acid is the result of the growth of bacteria which have been killed by heating.

Q.—Pasteurizing of the whey would not prevent the fat from rising?

A.—Yes, it would. That is one of the troubles of pasteurizing milk for the city dairy business because the cream will not rise on that milk and the people think they are getting poor milk.

Q.—How often should you wash out the whey tank?

A.—Wash it every day if at all possible.

Q.—Sometimes our whey tank is not washed out for two weeks?

A.—I have heard of a case where the tank has not been washed out for two years.

Q.—I attended a meeting from this district where a man said to us their whey tank had not been cleansed out for eight years; or since the factory was built.

Q.—I would like to hear your experience as to the feeding of whey to poultry?

A.—We have tried it and we have concluded that it helps digestion, but as to the feeding value of the stuff itself, I would prefer that Professor Graham should answer that question.

Q.—Do you think this pasteurized whey is good for young calves?

A.—Yes, where farmers have fed it they have had very good results. You should start with a small quantity.

Q.—Do you think it would pay to put in a steel whey tank?

A.—I think a steel whey tank is the only suitable kind of a whey tank.

Q.—Would it pay to pasteurize whey and put it in an old wooden tank?

A.—It would pay, but I would certainly prefer to have a steel tank, and I would prefer to have it pasteurized rather than not pasteurized and put in a wooden tank

Q.—Where it is run through a separator, would you pasteurize the whey?

A.—Yes.

Q.—Is not it pretty nearly pasteurized after it comes from the separator?

A.—It is only 98° to 100°, and that is not high enough, if it is heated up to 140° or 150° that would be pasteurizing it.

Q.—How much does the separator reduce the feed value?

A.—We have found as a result of experiments that the feed value of whey is decreased 25 per cent. by separating the fat from it.

Q.—How much butter can you get from 100 lbs. of whey?

A.—From 1,000 lbs. of whey we have made 2½ to 3 lbs. of butter—3½ the most and 2½ the smallest amount. I understand some factories in the East have been making 4 and 5 lbs., and I have heard of them making as high as 8 lbs. I would come to this conclusion that either the milk is badly cared for or you have an incompetent cheese maker where you get 8 lbs. of butter per 1,000 lbs. of whey. There is something radically wrong where you get such a large amount of butter.

Q.—In our factory we only get 1½lbs.

A.—That is more like it.

Q.—What is the difference in value between whey butter and other butter?

A.—We have found the difference to be from two to seven cents a pound; when butter is scarce we can sell whey butter at two cents less than the price for regular creamery butter, but when butter is plentiful we have to coax dealers to buy it and we have had to take seven cents a pound less.

Q.—Is there any difference in the taste?

A.—I think there is quite a marked difference, some people think it takes an expert to tell the difference between whey and creamery butter, I would not think so. It is a second-rate butter.

Q.—How about the keeping qualities?

A.—We have found it has fairly good keeping qualities. We have not found that it deteriorated rapidly after being made. If kept at 40 degrees it will keep fairly well for a month or six weeks, but it is always second-rate butter.

Q.—Whey butter is winning the first prize at the Fair?

A.—Probably it was pretty poor butter that was against it.

WINTER FEEDING OF DAIRY COWS.

By J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

I take it that my subject means the feeding of cows in milk, not feeding in a general way, but feeding cows from which you want to get all the milk possible. I shall try to condense my remarks as I want to take up some of the general principles.

The first thing that the farmer or feeder should consider in feeding dairy cattle is how to get them to eat much feed. The cow that does not eat a lot of food is not going to produce much milk. Some are more readily persuaded to eat freely than others and some make better use of their food than others. As you know, the cow, as well as the human being has her likes and dislikes so the great problem of the feeder is to study his cows so carefully as to enable him to persuade them to eat freely.

The next consideration is to see that the food is easily digested. If you can flavor the food so as to persuade the cow to eat a large quantity of it and then have a food of an easily digested sort then you will surely have a large flow of milk. The primary consideration is a large quantity of food and that food easily digestible.

The next consideration, and probably the consideration that is really most important is the composition of the food. The food must be of such a character that when it is digested it will furnish to the cow lots of elements which enter into the making of milk. If the food does not contain these elements, then the cow cannot make the milk, because the milk is composed of certain elements which must enter the cow through the food. If the food is too rich in elements for the production of fat then the cow will be persuaded to put on flesh to a greater or less degree.

There are thus three points which the feeder must consider in preparing his ration. First, to get the cow to eat large quantities of food; second, that the food be easily digested; third, that it be of the right kind.

The first consideration is the all important one. Get them to eat lots of it. How are you going to do that? The reason you yourselves will eat more at one meal than another is generally that the food offered is more palatable. You like the taste of it better; that is the reason the average cow eats more of one kind of thing than another. She likes the odor of it; it pleases her palate and she eats a large quantity of it; therefore in preparing any ration for dairy cows, that must be the primary consideration, palatability. Get the food so that it will taste good to the cow and have a pleasant odor then the cow will eat a very much larger quantity than where such is not the case.

How can we lend palatability to the food? How can we get the cow to like the flavor and the odor of the food we furnish her? The first way is to try and make it succulent. Get a nice juicy food. When the cow gets on grass she will eat and eat. Cows have been known to eat 100 lbs. of grass in a day. That is an enormous quantity of food and she ate that, not because she felt that she needed it, but because she liked it, and if we can get the same odor, the same flavor and the same succulency into the winter foods that exists in the June grasses then we are going to persuade our cows to eat large quantities.

How can we get succulency? In various ways. If you have no ensilage, sprinkle water on each layer of cut straw in place of ensilage and roots, and then sprinkle on it a little bit of meal and then another layer of straw and then meal. That is the way many dairymen used to feed their cows years ago, but that has been abandoned by the introduction of the silo and the large extension of the root growing industry. We have given that system of feeding up almost entirely, and have gone in for roots and corn ensilage. There is nothing up to ensilage if it has mixed along with it a certain amount of straw; in addition to the ensilage one might feed a small amount of roots, turnips or mangels or sugar beets. We have found on the Experimental Farm that a ration consisting of about two parts of ensilage, one part of roots and a few pounds of straw, about one-quarter part straw, makes a roughage ration that is very hard to beat. The cattle will eat it ravenously, in fact it often looks as though they would hurt themselves eating this ration and that without our having added meal or anything of that kind to it to improve the flavor or change the taste.

We can improve that a little by adding a small amount of salt. Sometimes a tonic is advocated, we do not consider that advisable. If you have none of these things, as a last resort you might cut your feed and sprinkle on it a little bit of highly flavored meal of a little bit of stock food. I am not an advocate of stock food, but I believe if you are trying to force your cow, and you get some stock food that she likes, you can persuade her to eat a little more of the food and so improve your chance of getting a lot of milk. Stock food has very little or no value in itself, but I think it serves as a condiment, just the same as when you get soup that does not taste very well by adding some sauce to it, you can make it go down better and that is the reason I think stock foods may sometimes be of value. We have not found them of any food value at all.

Now, as to digestibility,—the foods which are palatable and which are succulent are also the foods usually most easily digested, and most easily taken up by the organs and made into blood and from blood into milk. Of all the foods you can give to the dairy cow, roots are the most easily digested and most palatable; therefore you have in roots a combination of digestibility and palatability, just the very thing we want. For the man who is feeding dairy cows there is no doubt that the addition of roots to the ration is invaluable. The digestibility of a ration may also be improved by giving the right kind of food. Some foods are difficult to digest, as for instance, wheat straw and some of the other coarser straws and poor hay. It takes a large part of these to furnish power to the digestive organs to carry on the operations. You must therefore get a ration of a high percentage of digestibility.

After digestibility comes the composition of the food. It should be of very high milk producing value, must contain elements that go to produce milk and the chief element for that purpose is protein. Clover hay contains a large amount of protein; mangels, sugar beets or turnips or sugar mangels and oats are also quite high in protein and are accordingly very valuable for dairy cows.

When we buy meal we should pay attention to the kind of meal we are getting and its composition. The meals which are most suitable are first, bran. It is valuable on account of its high digestibility and richness in protein. It possesses the three points I have mentioned; it is digestible, it keeps the digestive organs in good shape and it is rich in protein.

Next comes oil meal. Oil meal is undoubtedly one of the best foods any man can give his dairy cows and at present prices it is the cheapest food on the market. Oil meal has a peculiar flavor of its own that seems to be agreeable to the palate of the average cow and it has a flavor that persuades the cow to eat much more of the roughage with which it may happen to be mixed than any other meal that I know of, therefore it is one of the very best meals a farmer can buy. It is rich in protein and also easily digestible.

There are certain foods very palatable but they are not so rich in protein and are not so suitable for the dairy cow. For instance I might mention barley; cows like ground barley and corn meal, but it is not advisable to give them these two foods in very large quantities. If you feed oil meal and bran in large quantities, the addition of a small amount of corn meal or barley will not do any harm.

Oil meal is very highly digestible, in fact it is almost entirely digestible and will serve to keep up the vitality of the cow. If you are feeding a ration too rich in protein you are apt to have an expensive ration.

Then, again, certain meals add flavor to the milk; give it a color or flavor that is of value, especially to the man who is selling milk. I might mention oil cake meal, corn meal and barley and oats, these four meals are peculiarly valuable in that respect. They all seem to have the effect of pleasing the palate of the cow, flavoring the milk and giving a good appearance to the milk.

I would like to say a word as to the economy of rations. We have been trying two kinds of feed, we have tried them practically every winter and I might say when you can get oats, peas and bran at normal price, when you don't have to go over $25 a ton for oats, nor over $18 or $20 for bran and you can get peas under $30, I know of no combination that will give better results.

Feeding the Cow. We prepare a mixture of roots and ensilage and then give her a portion of meal right on top and give it a stir with a shovel so as to compel the cow to eat meal and roughage at one and the same time. We give water and salt with the mixture of roots and ensilage as it is prepared on the feeding floor.

Q.—How often do you feed in a day?

A.—Twice in the day; we feed the first thing in the morning ensilage, roots and so on with the meal, then after they are done with that we give them a feed of long hay, and by a feed of long hay I do not mean very much, about four pounds a day, just a little handful in the morning and as much at night. About four o'clock in the afternoon we give them another feed of ensilage, roots and meal and after they have eaten that we give them another feed of long hay. That is the way we feed them and that is what we call twice a day.

Q.—How would oats, wheat and barley in equal portions mixed with bran do?

A.—Do you mean as much bran as you give of the other three together? Yes. That is a very good ration. Wheat, we found, is not as valuable for feed as it is for flour, you cannot make as much money out of it and unless you can buy cheap wheat such as wheat screenings or slightly spoiled wheat at a low price, I would not advise feeding any wheat. We have tried the combination, oats, peas and bran many times in comparison with practically all the foods that have been on the market and we have found nothing that will surpass it. At present prices it is not the cheapest combination. Peas and oats are very dear and we have substituted oil cake meal and gluten meal. These are the two foods that are cheapest this year. Oil cake meal at present prices along with bran, and if you like add a small amount of oats, because there is nothing that seems to tickle the palate like oats, this will give you a meal that if fed in right proportions with oil cake means excellent results.

Q.—How much meal should you give a dairy cow?

A.—If you are selling your milk at from $1 to $1.50 per hundred pounds you would not want to give more than 1 pound of meal for 4 to 5 pounds of milk. Regulate the meal according to the milk produced, but if you are getting 2c. a pound for your milk then you can afford to give as much as one pound of meal for three pounds of milk produced. I have been experimenting on this, and that is the conclusion to which I have come, you must not give too much meal for low priced milk because that is an expensive way of making money, and in my experience it will not leave the same margin of profit that properly balanced proportions will leave. As to the method of feeding we find it advisable to sprinkle the meal on the roughage after it is put in front of the cows.

Q.—Do you find it pays to feed three times a day?

A.—We do not feed three times a day.

Q.—Have you fed ensilage three times a day?

A.—Yes, we tried that two or three years running, fed three times a day and twice a day and we found they would eat very little more when they had it three times a day, and we found we did not get a pound more milk from ten cows when we were feeding it three times a day than we got when we were feeding twice a day. In fact we found if anything there is a slight advantage in favor of feeding twice a day. We found we saved the labor and after the cow got through eating their morning hay they laid down and were comfortable until it was time to feed them in the afternoon.

Q.—At what time do you feed in the morning?

A.—Our men start to milk at half-past five and they are through a little before seven and then we feed. We do not give them any feed until after milking.

Q.—Have you had any experience in feeding without hay?

A.—The hay seems to agree with the cow and she seems to like it and she seems to give proportionately better results than when she does not get hay. We found it is advisable to give a little bit of hay. The fact that we change to no hay makes the cows a little bit annoyed and anxious and they do not give as good results. If you make any change in the cow's ration she is apt to resent it. We found it best to give a litle bit of hay, but we only give four pounds to each cow, that is only eight hundred pounds to a cow in the winter and it is a very small item.

A MEMBER: I have been feeding hay for a while and it gave very good results.

PROFESSOR GRISDALE: I think when you get your cows accustomed to it you can get along without hay. This year we fed all our young stock without hay; we are giving them long straw without hay and in place of hay we have given them about one pound of meal.

Q.—How often do you give them salt?

A.—Every meal, we mix salt with the mixture of ensilage, roots and hay.

Q.—How about Alfalfa?

A.—A lot of our hay contains alfalfa, we grow alfalfa all over the farm, in mixture, not pure. Where you have it pure then of course it will very largely take the place of bran or meal. It is rich in protein and cattle like it very well and we find it a most satisfactory feed.

Q.—What about corn that is shocked and is brought in and cut up and fed?

A.—One hundred pounds of it is a good deal more valuable than one hundred pounds of ensilage, but if you set up ten tons of corn in the shock and you have a favorable winter you will probably save six or seven tons of it; whereas if you have a bad winter you will probably get only four or five tons of it and then very often it gets wet in the fall and it will start to mold and there is more or less must in it and cows do not like it. Then often in winter we get a heavy rain and it freezes right through, and if there is anything that will make a man risk his soul it is hauling frozen corn in the shock. I have been through the experience and I know it is a vexation of spirit from the beginning to end.

Q.—Could not you stack that corn?

A.—I have left it in the field and I have brought it to the barn and built trestles and put it in rows so that the wind would blow between. One winter I put it in the barn, threshed early, and put a layer of straw and then a layer of corn stocks and a layer of straw and I didn't pay much attention to it for a while till one day I went into the barn and noticed a peculiar smell; went on the straw mow and things were warm there, I can tell you. We worked that day and got it out, but I never tried that plan again, I believe it can be done, but you must use a lot of straw. I get the best results by standing it up on top of the hay mow. If you really want results from corn you must have a silo, you can get more value out of an acre of corn in the silo than any other way.

Q.—You advocate a silo every time?

A.—Yes, I know positively it is the only way to do it, I do not believe I would grow corn if I could not put it into a silo.

Q.—Which would you rather feed, corn that is in the stalk or in the silo?

A.—In the silo.

Q.—Is not the corn damaged to a certain extent by putting it in the silo?

A.—It is changed slightly in composition, but it is quite as palatable and it is a great deal more convenient. If you are feeding it from the field, there is only about a week when corn is just right and you can only feed to advantage that one week. After that the cows will not eat it all and you waste a lot, and I think such waste more than makes up for the little of change in the composition.

Q.—What kind of roots do you advocate?

A.—Mangels and sugar beets will give you best returns per ton, we have got better results from a ton of sugar beets than any other roots we have fed.

Q.—Do you think there is any more milk in turnips than in mangels?

A.—I am inclined to think so, we feed turnips right along and we are catering to the best trade in Ottawa.

Q.—Where you grow alfalfa with the hay, will it not get too hard before the hay is ripe?

A.—We do not grow it in timothy; we cut all our clover in June. If we had alfalfa alone, we would cut it from the 15th to the 18th of June.

Q.—What corn do you find best?

A.—Leaming, Longfellow, Compton's Early and Early Mastadon. We try to mix them in the silo.

BREEDING AND REARING CHICKENS.

By W. R. Graham, Manager, Poultry Department, O.A.C., Guelph.

This address was made up largely of descriptions of the stereopticon views presented. The following discussion took place after the address:

Q.—Do you keep the chickens in the corn field every year?

A.—Yes, we generally have a corn field available and we keep the chickens in it because we think it is a good place.

Q.—How do they cultivate in that orchard?

A.—They have a regular disc-plough for that purpose.

Q.—What percentage of zenoleum do you use in the machine?

A.—We use a 10 per cent. solution and we wash the incubator thoroughly inside. The action of the zenoleum probably come from its disinfectant qualities. You should be very careful not to give the little chickens mouldy food. Occasionally you will find little nodules in the lungs of the chickens and that is caused from the mould on the food getting into the lungs and growing there and in many cases the mould is in the egg when it is laid.

Q.—How soon do you feed your chickens after they are hatched?

A.—48 hours. The first meal the chicken gets is new milk fresh from the cow. We aim to take the chickens out of the incubators at the time they are milking at night and we give every chicken some milk. We dip its bill in the milk and a great many of them will drink before they will eat. Every time we go to feed them we drive them out. We spend a little time on them at the start and we try to make them all take a drink of milk.

Q.—How do you use buttermilk in the incubator?

A.—The reason we use buttermilk in the incubator was with the idea of producing a certain gas which we found would grow in the buttermilk, and we put into the buttermilk a culture of bacteria to produce this gas. We use a galvanized iron pan at the bottom of the machine and we fill that full of buttermilk and at the end of a week we put in another lot. If you are using zenoleum in the machine at the same time as buttermilk you will find it makes a very rank smell. We got about as good results last year from zenoleum as we did from zenoleum and buttermilk.

Q.—Do you attribute any beneficial results from buttermilk?

A.—We apparently got some beneficial results from buttermilk. I cannot make any positive statement as to that.

Q.—The buttermilk that you used was infected with bacteria?

A.—The first three experiments the buttermilk was infected with bacteria and the others without bacteria.

Q.—Did you find that putting water in the incubator will affect the moisture?

A.—Yes, I have got better results from every incubator when I used moisture in the machine.

Q.—Do you put the tray in the bottom of the incubator?

A.—We put the tray immediately below the egg tray. We slide the moisture pan on top of a slat that is nailed to the bottom of the machine. It is an inch on each side short of the width of the machine. We get 10 per cent. better results from using water. If you are in a very moist locality you might get as good results without water.

Q.—What do you feed the little chickens on before you start feeding them wheat?

A.—In natural incubation we use nothing but pin head oatmeal, cracked wheat and cracked corn.

Q.—What do you call pin head oatmeal?

A.—Old fashioned oatmeal. We feed them oatmeal, cracked wheat and fine cracked corn. We feed dry at this season of the year. We use hard boiled eggs, bread crumbs and onions during the winter months when there is no grass run. We must make them eat green food right from the commencement, and that is a difficult proposition in the winter time to what it is in the summer. If you find your young chicks want to sit down or get leg weakness in the brooder then you should get them out in the open air. Drive them right out in the open air even if they run right back again. We drive them out twice or three times a day. At the Courtis Duck plant they drive the young ducks out on the snow every day.

Q.—Do you get good results from feeding hard boiled eggs?

A.—We get fairly good results in the winter. We use two hard boiled eggs and a half loaf of bread. We crumble the bread and put in two ordinary sized onions. The onions and the egg are put through a meat chopper and mixed together with the bread and when the chickens get about a week old we take an ordinary bone and put it in the coal stove and get it to glow, all red, then put it into a pail of water and make bone charcoal and we mix that in with the egg. The idea is to supply the chick with sufficient bone material. In the summer time when we get 1,000 little chicks at a time, the egg part goes out of existence, because we have not time to grind them up, and when the grass is green it is not necessary.

WHAT THE RAISING OF MORE SHEEP WOULD MEAN TO EASTERN ONTARIO.

By A. W. Smith, M.P., Maple Lodge.

I have rather a difficult theme to speak upon this morning. The simple fact can be told in a few words, the advantage to the farmers of Eastern Ontario in raising sheep, is that they are more profitable than any other class of stock or any other line of farming which they can undertake. That is about the pith of the whole thing. I can cite to you a few instances in other countries in proof of this. In the Eastern part of Ontario you have not the same quality of land as in the Western part of the Province and I think you would get more advantage from the raising of sheep than any other class of stock and you would have more advantages than we would have in the west. We are a lazy lot of people in the western part of the province or it seems we are rapidly approaching that. Our land there is rich and fertile, especially down in the peninsula; including five or six of the most extreme south-westerly counties of the province. We have changed our system of farming on account of the scarcity of labor, and our land is adapted to the production of very nutritious grasses and we are able to fatten and finish for the export market bullocks of the first-class type. There are a number of places where they finish with grain, where they might probably out-class us but in that particular part a great many farms have been set aside to pasture and there are not many parts of the province that are so well adapted to that. It is a lazy kind of business and a man doesn't make much money but he has no work and not very much worry in connection with it. In the Eastern part of the province you are not able to do that because your farms are not as rich and you have not the same kind of grass that will finish cattle as well as we can in the west and there comes in the advantage of raising sheep in this part of the Province. Sheep are next to the grazing of cattle, the best thing to lessen the labor in connection with farm work. Of course, I understand thoroughly that in the east you are devoted largely to dairying and that is a very profitable industry. Along with that there is a large amount of work that could be obviated by the raising of sheep. It has been proven in a large number of experimental stations that sheep can be raised per p und more cheaply than any other kind of live stock, and that is certainly an advantage to any person undertaking farming. If you take almost any part of the world where almost any other kind of stock, except goats, will fail to make a profit, then sheep come in and are profitable to those who can handle them. Down in South Africa on the Veldts where they have not nearly enough rain and it is practically a desert they are making profitable sheep ranches. In the Western part of the United States in what they call the dry belt or the great American desert, they tried cattle and the cattle ranches have been deserted, and for a number of years they have been making money out of sheep ranches. Sheep are able to assimulate the different kinds of vegetation they have there. They have a considerable amount of grass growing in the different parts of that district, but the feed is very largely sage brush and the sheep are the only class of animal that will consume that sage brush and turn it into a profit. In the Western part of the Province we have proof that on the best farms we can make sheep more profitable than any other kind of stock. We can get greater returns for the labor necessary and we can have a better and safer outlook for our investment. While the raising of sheep fluctuates the same as other stock we always have two avenues of profit and we have not that in any other class. We have the advantage of the increase in our flock for mutton purposes, and then we have the returns from wool. It has been for a number of years, considerably better than it was a few years ago, and although it has been cheap this year I think the indications are that we will have a considerable raise in the price and that will help greatly. For an average of twenty years on our pasture lands the farmers who have followed it out have proved to their own satisfaction that they can make better returns raising sheep than they can in any other class of stock. But when you come to where the land is not so good and where you have rough land and broken land then the advantage of sheep raising comes in very strikingly and we are able to put them on the land and raise them at greater profit than we can any other class of stock and that is the reason why it would be better for Eastern Ontario to raise a great many more sheep than they do at the present time. Then where we have farms on which we can raise all class of grain, we can increase it more rapidly by raising of sheep than we can by any other class of stock. Up in Yorkshire, England, on the chalk hills where the soil is not much more than the depth of a plow, they are able, by the use of sheep to make it one of the most fertile and productive parts of Great Britain, notwithstanding that the soil is light they are able to produce, on that kind of soil, crops equal to any in Great Britain and there are some very fertile parts down in the South and North, yet in Yorkshire they are able to produce as much as the others and they do it largely from the use of sheep and they have been doing it for a great many years. Their grain crops are equal to those in any part of Great Britain, in fact I believe the wheat average is the largest of any part of England. That is not the class of land you have in Eastern Ontario, but you will get that further North. In Scotland where it is still more rough we find that sheep are the animals that they can make the most profit from and from which they can pay their rent and make a livelihood.

The great incentive in Ontario at the present time to raise sheep, is, that they are more profitable and that they can be raised and handled with a great deal less labor.

The CHAIRMAN: While you have been talking, two ideas have got into my mind and when I get an idea into my mind, I like to sew a button on it for fear I would not find another. There two things which are of the utmost importance to the sheep breeders of Eastern Ontario. One of them which has perhaps discouraged the industry more than any other is, the question of dogs killing sheep and the other question is how many sheep would be profitable to keep upon an ordinary 100 acre farm.

Mr. SMITH: With regard to the first question, undoubtedly the sheep men of the province are entitled to protection from dogs. There are undoubtedly a great number of people who give as a reason for not keeping sheep that they are afraid of the destruction of their flocks by dogs. I have been on a sheep farm ever since I was able to understand anything in connection with sheep and I have always been very much interested in them and I have taken a great deal of pleasure in working among them and handling them. We live in a section of the country where there are a large number of dogs kept and yet we have never had dogs attack any of our flock. Some people have said to me, you have been very fortunate. There is reason for that good fortune. We have found it profitable to enclose all our sheep at night in pastures or corrals or yards that are dog proof. We have fences around the field they are in, that the dogs cannot easily get through. I have an interest in a little ranch out in Alberta, where we keep a considerable number of sheep, and although it is quite close to an Indian Reserve where they keep a great many dogs and although there are a great number of coyotes, I solved our problem in the same way there, and although we have to have a shepherd look after the sheep; every night, they are brought into the enclosure. It is fenced with pretty close woven wire and since we have been using that we have had no source of loss at all from coyotes or dogs at night. I am quite certain we are entitled to better legislation for our protection. Some means should be taken by which the number of dogs could be lessened in this country.

Q.—How many sheep should be kept on a 100 acre farm?

A.—That is a point on which I haven't any hesitancy in speaking. I think it would be very undesirable for any person, until they are thoroughly posted on raising sheep, to adapt your whole farm to that purpose. I think in Ontario it is a mistake to devote the whole farm to any particular line. I think a flock on a one hundred acre farm should be from twenty to twenty-five, and I think that is the limit of profit where you are going into mixed farming. I think that you will find that number will be more profitable on a hundred acre farm. Any person who is interested in sheep raising should get the bulletin issued by the Dominion Department of Agriculture, treating on that industry, and one of the very best I have seen published in any country.

ECONOMICAL FEEDING OF BACON HOGS.

BY J. H. GRISDALE, AGRICULTURIST, CENTRAL EXPERIMENTAL FARM, OTTAWA.

I am asked to speak on the Economical Feeding of Swine. I will not give you the details of any experiments we have been carrying on lately, excepting as they bear on the economical feeding of swine. In a general way, a man who wants to produce bacon economically must start at the very beginning. He must start right from the moment he buys or breeds his brood sow, because everything you do in pig breeding makes for profit or loss on your finished product. If you buy a sow, keep her a year, and she then gives you five pigs and has cost you $20 keep for that year, your little pigs have cost you $4 a piece, but if at the end of the year she has cost $20 keep, and has given you ten pigs, there is a reduction of $2 a pig right straight. Thus you see you cannot be too careful in starting if you are going to go into the bacon industry. You must start with the right kind of sow and one of the principal considerations in selecting a sow is her prolificacy, see that she comes from a strain that gives large litters. Then again get easy feeding pigs that are unthrifty are almost impossible as a means by which to make money; we must have good thrifty pigs, and this again is often a matter of strain. Next we want pigs of the right type. Getting unthrifty pigs means two or three per cent. difference in the profit or loss, getting pigs of the right type means a gain or two or three per cent., getting pigs of the right strain for prolificacy means a gain of ten or fifteen per cent., or in all twenty per cent. on your profit or loss. The importance of starting right seems therefore to mean about one-fifth of the whole thing. In selecting a sow from among your own herd or elsewhere, care must be taken to see that she is likely to be prolific. She should come from a large family, and she should be marked in such a way as to indicate that she will give large litters and she should be from a healthy vigorous strain since these points decide ultimately whether you are going to make a profit or loss. If you have one that will cost you $15 to feed for the year, she will likely make more profit for you than one that costs $20. Then brood sows must be fed cheaply. You do not want your sow to be kept ready for the block right through the breeding season. She should be kept in a good vigorous healthy condition, with just enough flesh to make her feel comfortable.

Let me draw your attention to an experiment we carried on at the Farm last winter, that gave us must satisfactory results: it was a gathering together of all we had learned in past years. We took 29 brod sows, turned them out in the field, gave them some cabins in which to sleep, and fed them as follows:—During the months of December and January we gave them all the clover hay they would eat, about 12 lbs. roots, and about a pound of bran a day. For the latter part of January and all February they got from two to three pounds of meal instead of 1 lb. in addition to the supply of roots and clover hay. These pigs during the first period of the feeding operations cost us two and three quarters cents a day to feed, and during the latter part cost us five cents a day, so that they cost us an average of about four cents a day right through the time they were carrying their young or somewhere around $4.50 or $5 for the winter till they farrowed. To this add a couple of dollars for feed while they were nursing their young. Thus each litter cost us $7 or $8 at weaning time. They gave us as large, thrifty and healthy litters as we ever had.

This experiment is being repeated and at the present moment we have fifty sows eating hay like horses and cows and being fed roots. At present they are getting about two and one half or three pounds meal per sow per day. Sows that are going to farrow first are getting the heavier meal ration. Last year when a number of men from the Western Provinces came down and saw our sows they made fun of them, but when I went west and saw their litters, I had a chance to condole with them. Our experience now extending over several years seems to show that the above is the best way to feed sows in order to get the very best results in the way of healthy, vigorous and large litters. They do well afterwards; we did not have one bad pig come last spring.

Q.—What about ensilage for feeding sows?

A.—I have tried ensilage but I do not like it very well, they do not eat the coarse part of the ensilage very well, and they waste a good deal but if you feed them clover hay, they do not waste anything at all. I would rather give ensilage to the cattle and roots to the pigs.

Q.—Do you feed the clover hay whole or cut?

A.—Whole, we have racks something like sheep racks and they stand around them like a lot of sheep.

It is important to feed the little ones so that they will keep right on growing and in good health as long as they are with the mother. That, of course, depends on the way you feed the sow, she should always receive rather laxative food, rich in protein but not in too large quantities. You want to be careful that it is very wholesome food, because there is no animal that seems to transmit any peculiarity of the food so quickly and readily to the young which are living upon her milk as does the sow. If you give the sow some laxative food, first thing you know the little ones are affected. Keep her right and the little ones are likely to be right. In a short time it pays to give them a little feed in addition to the milk they are getting from the mother, especially in the case of large litters. They should have something in the way of skim milk or a mixture of shorts or oil cake meal and finely ground oats. There is nothing quite comes up to skim milk as a cheap, highly valuable feed. If, however, you can start them off with whole milk, it is better still only you must be careful not to feed it too rich. Keep the little ones with the sow until seven or eight weeks old. That looks like a hard strain on the sow but it will be to the advantage of the little ones. This is the best practice for the economical production of bacon. During the growing period we want to keep them in vigorous condition; we want them to have a good strong frame and lots of well developed muscle, that is the time when they are getting ready to do the finishing off act cheaply. To begin to fatten right after weaning is to get short thick fats.

The period from the time they are 2½ months until four or five months old is not generally speaking a very profitable or cheap feeding time, you can feed them cheaply but they do not make very great gains in weight. You must however, feed them that way or later on they won't make cheap gains of the right kind of meat. After they have reached the age of 4½ months, feed them heavily for a month and a half, they will make remarkable gains if they have been fed in the right way after weaning. A little bit of skim milk, or a little bit of finely ground oats or shorts, and some pasture if it is in the summer, or roots in winter, is the way to feed after weaning. Keep them growing on that, and then the last period feed them for all you are worth.

I have tried about every mixture I have ever heard of, or could prepare myself, and I will say that we have got the very best results from the simplest rations with this modification that we very seldom find one single grain or even two mixed that will do as well as a mixture of several kinds of meal. Where one has some barley he wants to feed his pigs, he had better sell off a few bushels of the barley and buy a few other things and mix with it, and the same applies to other grains or feeds. We find a mixture always does very much better than one grain, and a mixture of three or four grains will do better than one or two. These three, oats, peas and barley, fed in about equal proportions will give good results, and if you have no roots an addition of a little bit of oil cake meal will very largely take their place. If you have no roots of any kind or potatoes, then add to 100 pounds of each of these others 50 pounds of oil cake meal, making a mixture on which your pigs will thrive.

To show how cheaply gains may sometimes be made, let me give you two or three experiments we conducted last winter. Prices for mill feeds and grain have been very high. We took them at market prices and I found that when we were feeding the ration I have described, and feeding along with it an equal weight of roots or potatoes or skim milk, any one of them or all combined, we were able to produce pork for 4½ cents per pound live weight, from the time they were weaned until on the block. We produced a two hundred pound pig for less than $9 and we have never got less than $10 for that pig. We did not of course produce all our pork as cheaply as that.

Among other experiments we fed frozen wheat last winter, and it cost us quite a bit more to produce 100 pounds pork live weight. In one case where the pigs were just in the finishing period, however, we were able to produce pork during seven weeks just as cheaply with frozen wheat as with any of the mixtures but we never did it before nor since.

Q.—Are the roots cooked or raw?

A.—We have found that roots will do well either way. If you are feeding mangles I will say it is just as well to feed them raw, giving them whole or pulped. We have fed our sows both ways and I do not see much difference. For feeding young pigs, however, I am not prepared to speak positively. We are working on that at the present time, feeding about thirty pigs and comparing roots pulped and cooked. Our past experiments seem to show something in favour of cooking roots, but then we do not calculate the cost of cooking. I am afraid if we took into consideration the expense of cooking it would not pay.

Q.—Do you feed meal wet or dry?

A.—We feed our meal wet. Where you have a large feeding floor that you can keep clean, and off which the pigs are not likely to run, then I would say feed dry. They do better on dry meal than on wet meal, but you must have a large feeding floor, or else they will run off it and waste the meal. Where we feed dry meal we try to prepare for it, making a platform so that the pigs can run up and grab a mouthful and then back away and chew it. Even then you will find that there is more or less loss, but if you have a good big platform, they will clean it up fairly well. You must in addition have a special trough to keep the water in. I think, therefore, it pays better to feed the meal mixed fairly thick rather than dry.

Another feed we have found profitable is small potatoes. You will always have some potatoes that are not fit to sell, and the best use you can make of them is to cook them and mix with them a little bit of meal. The same with pumpkins; cooked pumpkins mixed with meal have given us very large and cheap gains. In estimating the cost of these gains we charge small potatoes and roots at $2 a ton. We find the average cost of producing roots is $2 a ton.

Q.—Can you account for the falling off in our bacon trade in the old country?

A.—I think it is very easily explained. When you have to pay an increased price for meals ranging from 20 to 50 per cent., and the price of bacon is not a bit higher, the explanation is a very simple one to me. We have been feeding for several years from 200 to 400 pigs every year on the Experimental Farm, and it has kept us all our time to pay for the labor and feed this last year or two. Last year, 1908, from January 1st to December 31st, we made a few hundred dollars, but not very much, and we made it on the pigs that we fed in the right way. Pigs fed as the average farmer feeds them, do not make so much money, in fact many pigs that we sold for $10 cost us $11.

Q.—Do you feed corn at all?

A.—We have some rations including corn. It is capital feed, but very high priced at the present time. We have also fed gluten.

SYSTEM IN HORSE BREEDING.

By John Gardhouse, Highfield.

To my mind system in the breeding of horses in Canada has not been followed out along any particular line. While some men have made a success of horse breeding and have worked along certain lines and have had a very good system, generally speaking a good system has not been adopted by many of the breeders in this country.

When out on the Horse Commission a couple of years ago during the whole trip I cannot say that I saw any person who had what I would consider a really first class system in horse breeding. Now that is not as things ought to be. It is not good for the horse industry of the country. It is necessary that in the matter of horse breeding, as well as in any other line of business, that you should adopt a good system. While out with that commission we tried as far as possible to find out just what systems were being followed in the different localities. In many cases we found that if a pretty good fellow would come along with a fair horse and in some instances a very inferior horse, many a farmer would breed his mare to that horse regardless of whether he was a suitable horse for that mare or not especially if the fee was made low enough. Very often the average farmer would breed from a heavy horse one year and then thinking he could get a horse that would be more suitable for his work on the farm by breeding to a Hackney horse, carriage horse or thoroughbred horse he would breed in that way the following year; there was no system, and he appeared to have no ideal before him. In breedng horses there should be a definite aim. I remember one man telling me he had a pair of good Clydesdale mares, something that nearly every farmer in this country ought to have, and he told me his father advised him to breed these Clydesdale mares to a carriage horse because he said if you do you will get a typical pair of farm horses, a pair that will do you good service on the farm. I do not think it is a hard matter to get horses to do your work on the farm. You can do the larger part of your work on the farm with your brood mares and colts as they are growing up to the age when they will be marketable. So that the man who is aiming to breed a pair of horses to do his work on his farm is making a great big mistake because the average farmer cannot keep too many horses on the farm, and he should largely confine himself to doing his work with his brood mares and his colts. No man can make a success of any line of business whether breeding horses, cattle, sheep or swine, unless he has got some kind of a system. That is always important, and in order to get that system, one of the first things he should have in his mind is an ideal, something to aim at. That is important, you will find any man desiring to reach a high standard will have an ideal before him and he is is aiming to reach that ideal. Any person who has not got an ideal of his own is not going to accomplish that which he should. It matters not what line of business you are following, having set your ideal, let that be a heavy horse, or a light horse—and I am not here to advocate any breed of horses because we have quite a good demand for all breeds of horses if they are the right type of the breed to which they belong. But while I am not here to advocate any breed, I am compelled to say this, that, for the average farmer, I think you had better stay with the heavier breeds because you must, to a large extent do your work with your brood mares and young horses and if you are doing your work on the farm with these mares, the heavy horses will be more suitable. A light horse requires more time and experience to breed and raise in order to get out of it all that is in it. If you breed a good light horse you are liable to let it slide out of your hands before you know just what is in that horse; therefore I say for the average farmer the heavier horse is the more suitable one to breed. With your ideal in view be sure that you get the right type of havy horse to bred from. Get a horse with a fair amount of size and quality combined. There are some of our breeders who lose sight of quality in order to get size, and others sacrifice size in order to secure quality; but in order to attain the best results, it is necessary to have a fair amount of both. I like to select a horse with a good broad forehead, a bright clear eye, a nicely set ear, broad open jaws set well apart, and not a meaty but a clean cut throat, neck well arched, and blended well into the shoulders, a good depth from bottom of neck to bottom of chest, forelegs well set back under the body and well muscled, chest prominent, broad knee, hard flinty bone, nice silky hair, moderately long sloping pastern, good feet, withers well carried back, good spring of rib, strong back, nicely turned quarters well muscled down, clean, broad, strong hock; a good walker picking up every foot squarely and setting it down squarely. There is no farmer who can afford to breed horses unless he has a reasonably good mare to breed from. You may say "It is all very well for you to say that, but we have not got the means, we cannot afford to put the money into those high priced registered mares to breed from." In my opinion you cannot afford to breed from the light or poor mares that some of the farmers in this Dominion are breeding from at the present time. You can afford to sell some mare or horse you have on the farm that is not very good and add a little money to the price received and get a good mare with some breeding. I do not say you have got to pay big money for a mare that could probably come here and win, or go to Toronto and win; it is not necessary to do that, but get a good type of mare, then select a sire that will be suitable to bred that mare to. First see that you have a mare that is a good type of the breed to which she belongs, and a mare that has got a good constitution and a fairly good pedigree, because if there is anything wrong in the breeding it is something that will probably trace back two or three or four crosses, and you will find the men that have made the greatest success in breeding live stock of any kind are just as anxious that they shall have a good pedigree as they are anxious that they shall have good individuality. The two must go together in order to be sure that you are going to have something that will give you good returns for the money invested.

The number of mares the average farmer could breed will depend largely upon the amount of land he has, and the other kinds of business which he is engaged in. To my mind a farmer on a 100 acre farm could very well afford to keep one pair of brood mares, and that pair of brood mares need not cost him more than $400 or $450, and he can have a pair of mares that will practically do all the work on the farm, with another team to do the road work, and with the help of a colt or two he is fixed as far as horse labor on the farm is concerned. He should have no trouble in raising three colts in two years from these mares. You have double profit in the horse business because you can do considerable work with your mares, as well as raise the colts. If you are in the dairy business you have got to get all the profit out of the cow, in our part of the country we prefer the horse business, I think it is easier and much nicer work, and the more you study it out and think about it, and the more attention you pay to the little details, the more you will like it, and if we had our average farmer throughout the Province with an ideal, following out a certain system, and knowing just exactly what he is aiming to get, you would find that the horse business in this country would increase by one third. Just think what the revenue of this country would be compared with what it is if the horses were worth one-third more than what they are on the average farm. They should be worth that, there is no doubt about it.

You should thoroughly understand every point in your mare and where she lacks, then go and select a horse that is strong in those points. You will not get any horse perfect, and you will have to balance up in order to get the best results. Do not listen to the man that has got the horse; beyond a reasonable distance. If you are not competent to judge horses, it would be well to talk it over with some man who might be a good judge, some man who is not particularly interested in the stallion business. Get his opinion because you know stallion men are like other men, they are not going to tell you their horse would not be suitable, I will guarantee there is no stallion man here who would do that. I would not do it myself, if a man comes to another man who has got a stallion he is going to take the mare, but you should be sure that you know your mare from one end to the other, that you get a horse strong in the points where the mare is weak, be sure they have good hock action and knee action. Be sure they are good walkers. If you will follow that system that is practically all you need to follow. Just get a good mare, a good type of the breed to which she belongs, as near perfection as you can get her, then go over her particularly, as I have said, know everything about her, and then select the very best sire possible. Not only a good individual but one that is properly bred and one that is in a good man's hands, so that you will be likely to get a colt, because there are some men going about the country with horses that know very little about handling them.

Q.—Do you advocate breeding to the rangey stallion or the blocky stallion?

A.—That largely depends, as I have said before on your mare.

Q.—What does the market demand?

A.—I think the market demands a medium between the two. I do not know exactly what you may mean by Blocky Stallion or Rangey Stallion. The market demands a horse that will stand up pretty well, and harness up well with nice rangey appearance, not long legged, but still not a low down plug; the medium between the two would be about what the market demands.

Q.—What about the disposition of the mare and horse?

A.—The disposition is a very important thing. I have said and I am not at all afraid to say it here that a horse is a very intelligent animal. I have seen horses driven by men which I thought knew more than the men who were driving them. There is no reason why a horse cannot be taught pretty nearly anything, if he is taken in the right time, just as boys can be taught in school, so can horses be taught if they have the right men to teach them. It is important to try and look for intelligence.

Q.—Would you like to see restriction put on stallion owners limiting the number of mares. We get a lot of good mares as a rule. The sires are not limited to a certain number, and there is nothing to protect a man with a good mare whatever, and as a consequence he looses the mare.

A.—Do I understand from you that some of the stallion owners do not insure, and have come around with horses probably not very sure and travel by the season, and collect certain fees? That is not done with us. I know of no stallion owner with us that does not insure. If a man is travelling a horse for the season, then I say to the farmers be careful what you breed to.

Q.—How do you contend insuring will protect the farmer?

A.—Because you do not have to pay unless you get a colt.

Q.—You would lose the use of the mare for the year?

A.—To my mind it would be difficult to pass any act that would compell a stallion owner to guarantee that his horse would get a certain percentage of colts.

Q.—Are thoroughpins very objectionable in the stallion?

A.—A really bad Thoroughpin is not a good thing, but you will often get thickness in the hock which might be considered by some people to be a Thoroughpin, and they are possibly not.

FEEDING HORSES.

By John Bright, Myrtle, Ont.

The subject that I have been asked to speak upon for a short time this afternoon is Feeding Horses. It is a question akin to the horse business in this country. It is of as much importance as anything else connected with the business. We have often heard the old adage "feeding is half the breeding," and in order to get the best results out of the horse either for working or in breeding lines it is very important to understand how to feed them. There is no animal that will do better on the natural grass with the natural atmosphere and natural exercise and knowing that the nearer we get to these conditions the better results we will have from the feeding of horses.

In feeding horses on the natural grass in the summer season, they do not particularly need grain as long as they have the run of a field of good pasture, although they will do better with a little grain added. Some of us consider we have good pasture farms and we think they are not adapted to grain growing but the man who thinks he has a good pasture farm that is not a good grain farm is mistaken. Quality has got to be in the feed to give the best results, consequently the natural grass on good dry land that will produce grain is best.

When a horse is in pasture he has pure air and that is something we should try to get in the stable. For seven months in the year, we have to stable our horses and we should try to get conditions of air and ventilation as near the summer conditions as possible. The question of ventilation is something that has had too little attention from the farmers throughout the Province of Ontario. Stock of all kinds must have pure air, all must have well ventilated stables if they are going to make the best of the feed you are going to give them. We find in many stables throughout the country where the horses received the best kind of feed that they are not doing as well as they should and if more attention was paid to ventilation this state of affairs would not exist.

Exercise is absolutely necessary to a horse. You have to feed a horse so much to sustain life. You have to give them a certain amount of food to keep them just where you started with them and then the little extra feed that you give them means the profit. If you do not do this you lose the result of all the feed the animal has received, while the little extra feed you give them means the profit on the horse.

In order that a horse should develop properly he must have exercise and I think one of the greatest causes of the Scotchmen having better legged horses than we have is the fact that they are running out the year round and get more exercise than our horses do. If you feed horses as you should and do not give them exercise, you will be troubled with disease; there is not as much danger of over-feeding if you give them exercise as there is if you neglect it. Breeding mares require exercise. They should be hitched up and made to do the light work on the farm. There is no danger in working mares regularly, right up to the time of foaling. I have had as good a foal as ever I owned when I had to unhitch the mare from the plow and did not have time to get her to the stable. If a mare is fat and flabby, you will get a fat and flabby colt. If your mare is in good working condition with good hard flesh, you will find the colt will be the same. My observation has been that the man who gives his mare the proper exercise and a fair amount of feed will lose a very small percentage of colts. Joint ill has been the cause of much loss but it is very easily prevented by the old cure of using antiseptic from the time the colt is dropped till the navel heals. I lost all my colts for two years, away back in 1894, lost some 8 or 9 from joint disease before I started to try that remedy, and from the day I started to do so, I have never lost any and I have raised dozens of them. Last year I lost a colt. It was on a farm a little piece from mine and the man there was treating it and it got to be about 10 or 11 days old when we brought the mare up to my place and the colt took lock-jaw the very night it came up. It was a very valuable colt. I asked the foreman if he had used the antiseptic and he said "Yes, once a day," and I said "If you had used it three times a day, the colt would be living now." There is no use trying to do anything unless you do it thoroughly and there is no need of losing foals to-day if you feed properly, give plenty of exercise and treat the colt at the navel from the time it is dropped until healed.

We believe it is a very good thing to put grade stallions off the road as soon as possible and to get rid of the unsound ones. You had better not get your mare in foal than get her in foal to an unsound horse. Some men think they are in luck when they breed to a horse that cost $5.00. They would not think so if they realized that they get a colt that will never make them five cents profit.

Q.—What antiseptic did you use for joint ill?

A.—Use dilute carbolic acid, zenoleum or any antiseptic in the world as long as it is used thoroughly. It should be applied at least three times a day.

Q.—Should it be used immediately after birth?

A.—Immediately after, and until the naval is thoroughly healed.

Q.—What length would you cut the cord?

A.—I do not believe in cutting it at all, it is very rare that you have got to do it, I would sooner have it break off.

Q.—If it starts to bleed?

A.—If it breaks off, I never knew one to bled much.

Q.—Supposing you had to cut, what length would you cut?

A.—It should be left about two inches long.

Q.—Do you tie it?

A.—Tie close to the body.

Q.—What do you tie it with?

A.—A string that is disinfected.

Q.—If you are going to have a long drive, would you feed heavily before doing so?

A.—I say no, many mistakes have been made in that way. If you know a horse has a long distance to go, and you give him an extra feed, his system has got to contend with that sudden change of feed on the stomach, and it very often means a sick horse before you arrive home.

Q.—Would you fed a horse the same grain ration after they quit work, that you were feeding before?

A.—When you quit work in the fall and you know that you have not got much more to do, the feed should be cut down materially especially with the grain.

If they are work horses that you want to keep over for spring work, you should just try to keep them in good flesh. You should just feed them the required amount to keep them in their present condition, but they must have exercise, or they won't be healthy. A horse should have salt daily, we have practiced putting salt on their feed. I do not believe you can get a better condiment than salt, and if a horse has exercise I do not believe there is any danger in feeding a few oats if you add a little salt.

Q.—Is that the case with cattle?

A.—Yes, salt is a good thing for cattle and all live stock. A teaspoonful on the food would not hurt a horse but I think it is enough.

Q.—How much hay should a horse have with a gallon of oats?

A.—I have never weighed the hay so as to know exactly what the horse should get, but I believe in the experiments that have been tried in the colleges that one pound of hay per day for every hundred pounds the animal weighs is sufficient, although I believe heavier horses will require a few pounds more.

HOW TO SELECT A HEAVY DRAUGHT STALLION, AND UNSOUNDNESS MOST FREQUENTLY FOUND IN STALLIONS.

By Wm. Smith, Columbus.

When I received a letter asking me if I would say a few words upon this subject, the question arose to my mind,—Is there any need of talking upon a subject of this kind? I had to answer it in two ways. No and yes.

A number of men show a good deal of common sense and wisdom in selecting a stallion and others show the very reverse. I may say to you that in a great many ways I agree with every word Mr. Gardhouse has said to you. Your ideals must be of the highest, and in selecting a stallion I think it should be of the highest type, and you cannot have too good an animal. Another point I would urge upon your consideration is that he must be better than the mares, if you want to accomplish the very best results. In making the selection most men would probably have to consult their pockets in order to see how much they can afford to pay, and you will also have to consider your own personal tastes and your friends' and the people who live in your neighborhood, in order to know how many customers you will have. You must also consider how liberal they will be in paying. You may not think this of much importance, but if you want to get dividends out of the money invested you will find that this is of a great deal of importance.

In selecting a horse there are several things to be taken into consideration. He should have a good temper, you cannot put too much consideration on that point. I would like to have his under pinnings the very best. It is possible the horse might be required in a section of the country where the mares were of a general purpose character and then I think I would the mares were of a general purpose character and then I think it will be possible that you might have one a little rougher. Perhaps not with as much quality, but if it is in a section of the country where the mares are more improved then I think you should get away from that roughness and have as much quality as possible and that is true of the very best sections of this Province where heavy horses hold sway. The under pinning should be of the very best and when I speak of the under pinning I include the feet, pasterns and the leg generally, both before and behind, and of all things, keep away from meaty legs. Let them be as fine character and have as much quality as possible, and when I speak of a little roughness I would like to caution you against having it of a rough, hard kind.

The general conformation must be very much considered, because you will readily understand that horses with a good appearance are always more attractive than one that is not good looking. A stallion that has a fine appearance attracts attention equally as much as a fine looking lady. The middle of a horse, the length of rib should count for a good deal. A horse should always be able to carry a good hearty meal. I would select a horse that is a good walker because the heavy horses often end up in our cities, and if he is a good walker it counts for a good deal. His action also counts for something, not that he must be a trotter, but his action should be square and his hocks should come in together.

The neck should be of a fair length and I will tell you my reason for that, when a dray horse goes from the farm into the city he usually wears a heavy collar and if the animal's neck is too short he looks badly and you will find that our principal buyers are prepared to pay a little more for a horse that will show some length of neck outside the collar than a short one. If you follow somewhat on these lines you are fairly sure to be successful. The fact that certain stallions are not sure is one of the things that is troubling the farmers to-day almost as much as the owners and it is very difficult to arrive at any conclusion in that regard; it may be that the feed has caused that and it may be caused by want of intelligence on the part of the groom, and my experience is that from one end of the year to another a stallion should be fed wholesome and fairly nutritious feed; and that from one end of the year to the other it should have a fair amount of exercise, and I think exercise will generally be taken by a stallion if his yard is large enough.

If the owner, who has invested his money, and the farmer who is reaping a portion of the profits, pay attention to these points there will be no necessity for Mr. Gardhouse or myself to say that there has not always been, in this Province, a wise selection of horses.

You may say, "Will pedigree count for everything in an animal?" I do not think it will. Along with pedigree you want to have an animal of the ideal nature that I have spoken of this afternoon. Pedigree should count for something—breeding along the same lines for a number of years. There can be no question that when an animal is brought into this country it will play its part, therefore I would say by no means neglect the pedigree. Darnley, Prince of Wales, and animals of that character have played their part, and to-day Baron's Pride and Hiawatha are playing theirs, and you will make no mistake if, in selecting your stallion, you pay attention to pedigree.

There is just one other point I would like to mention and that is unsoundness, and this is often found in draught stallions; ringbone and spavin. I would not go too far on a bog-spavin, because, as you have been told this afternoon, a stallion which has been fed year after year havily and carrying a great amount of weight might possibly go a little wrong there; but if it is bone spavin, look out for that and I would say, be very careful in using that horse.

Q.—What about side bones?

A.—I do not know that I would like to throw down a good horse for a side-bone which was not likely to be troublesome. I know I am on somewhat dangerous ground in saying that, but from what I know of a number of stallions that were that way, I have come to that conclusion. Of course it is better not to have them.

I would rather not have a thoroughpin. I do not say it is hereditary, but I would rather not have it. Then there are the "roars," which might be brought about by inflammation or pneumonia. It is often not very troublesome. I do not think it is hereditary. It does not hurt a horse a great deal, but it decreases its commercial value.

Some of our heavy stallions have not good feet and if you get a small footed stallion I would not care to select it, I would rather have one with a good strong foot in every way. Another trouble is "string halt," and I do not think there is a man living to-day who knows what causes it. I was informed this afternoon by one of our most prominent veterinarians that the man does not live who can tell what brings that about; but there are too many stallions with that trouble.

Then there is the curb. That is an abominable thing, because everybody can see it, and it will often make a horse lame. There is a very strong feeling amongst horsemen that the larger a stallion is, the better. I am led to this conclusion that when they are over-grown or what you would call freaks, they are very uncertain.

If you will put on your thinking caps for a moment and look over the stallions throughout the country where you reside, you will arrive at this conclusion that, the moderate sized stallion of fairly good quality is the one that has left the greatest impression upon the horses in that section of the country. I think it is most important.

Q.—How do you exercise your stallions?

A.—We have paddocks of about an acre in size and we turn them out there one at a time.

Q.—Do you object to them being driven?

A.—No, I think if more of them were worked it would be better.

"HOW TO MAKE THE ROUGH FEEDING STUFF MORE PALATABLE."

By Robert Miller, Stouffville.

It pleases me very much to have an opportunity to speak to the people of Eastern Ontario on the subject of feeding cattle, and how to make the rough feeding stuff more palatable. That question is to be answered by me in this way.

First.—You must begin very early in the season. You must begin when you are cutting your hay and you must cut it early enough, you should make up your mind that you are doing one of the important duties that is required of the farmer, each and every year. If your hay is exposed to a rough, harsh rain, left in an unprotected manner, it will lose in one night half of its value, therefore you should be sure to cut hay at the proper time. Cut it before most people think it is ready, because then it is in proper condition to make good palatable food for your animals.

It is also important to cure your hay and preserve it in proper form. It has been said in this room that it was necesasry that each and every animal should have enough of every kind of food. It does not pay to fill an animal up with a concentrated food. You can place that food on the market and get good cash for it. Your animals should be filled up with rougher foods produced on the farm. Straw is the cheapest and the most valuable of the foods that you grow. I believe there is not one farmer out of every hundred, even of the intelligent farmers, of Ontario that attaches one-half the value they should to straw. You should take better care of it and feed more of it to your animals.

A lesson I have learned from successful farmers in my own neighborhood has taught me to believe thoroughly that working horses of the heavy class should not receive one mouthful of hay when you have reasonably good straw to feed to them, during the whole time they are not working hard; in the winter season. I have tried that myself and have worked perhaps as many horses and as severely during the summer season, as any farmer in this room. I have sixteen horses working on one farm and I can tell you that we are making a deep study of how to get the most work out of them. These horses never get one mouthful of hay in the winter season, but they get good straw and from the time we cut our oats and barley and wheat I feel more worried to know whether we are going to get that straw into the barn without a rain than I am worried about the curing and saving my crop of hay. I believe it is of more importance to me. Good straw is more easily digested and a more healthful thing to feed your horses and cattle, than hay. I do not want you to think that hay is not valuable when your horses are working.

They do not feed hay to horses in the Old Country; you can go from one end of Scotland to another and you will see stacks of hay, if you ask them what they are going to do with it they will not tell you they are feeding it to their work horses; they feed them oat, wheat and barley straw. Ask them what they grow it for and they will tell you they feed a little to their hunting horses and some to their driving horses, but they would consider it the next thing to poison to feed it to their heavy horses when they are not working hard; they would rather give them more corn—as they call oats—and less rough feed. I believe if you would copy from them and be more careful to save your straw by shocking your sheaves, and making a determined effort each year to put the straw in the barn without letting it be exposed to the rain, we would be making the best use of our feeds that could possibly be made by the farmers of our country at this time.

These same remarks apply to the cattle to a greater extent. The question of feeding horses is a different one. You must have them so that they can work. Your cattle do not get a great deal of exercise, and if you can make straw, and the rougher classes of hay more palatable so that they will fill themselves and lie down comfortably each and every night, it should be a great source of satisfaction to any man that takes the proper view of the position in which he is placed as a farmer in this country. There is nothing that gives me more comfort or tends more to make me go to bed at night satisfied than the thought that each and every one of the animals placed under my care have had just as much to eat as they would care for. I do not want them to be satisfied altogether with grain, that is not necessary, and it would not be profitable, it would be very unprofitable from a great many standpoints, but I do want them to have a good amount of palatable feed so that they can lie down and chew their cud through the night and be satisfied until they are fed again in the morning.

Corn stalks, either dry or converted into ensilage, is another very important addition to the rougher foods for cattle. I have a silo and I have filled it every year since I had it until this year. This year I had not very many cattle and I cut the corn when it was beginning to glaze, just about in the condition we would like to have it for the silo, and I had it shocked up very carefully. I tied the tops of the shocks into a small point, so that should it rain the corn would not get very wet and I have a splendid supply of feed, and my cows, sheep, and horses are glad to eat it. They thoroughly relish it and I believe it makes a splendid food for cattle, horses and sheep if properly mixed and fed to them, so that they will want to eat it up clean. I grind roots and mix them with cut corn and they stand mixed in that way for 12 hours. I take my corn inside. If you leave it outside you will have trouble. I know that some years it is difficult to get your corn dry enough to get it inside. It is most important to get your corn housed as soon as it freezes. It will pay you to go to some trouble to mix up your rough foods and see that they are palatable for your animals.

I believe if a man has some rough feed, such as straw that is not very good, or hay that is not very good, he ought to feed that in the early part of the season. Keep your sweet straw and hay to be fed in the latter part of the year. Corn stalks will not be relished by your cattle in the spring. Feed the refuse feeds that you have on your farms early in the winter when they will eat almost anything. That good brisk temperature that we are lucky enough to have in this country of ours will make these feeds good and they will nourish the animals well and make them thrive. In the spring of the year your animals are more dainty and want to have a little better and sweeter food.

Q.—How about feeding the cattle outside?

A.—I believe it is good for an animal to get the sunshine and a change of temperature every day. An animal that is kept outside all the time will never have tuberculosis, and an animal that is kept inside all the time will in the majority of cases get tuberculosis if the ventilation is not of the most up-to-date kind. You do not want the animals to be too warm. I do not believe in these basement walls that so many of us went to a great deal of trouble and expense to get, a number of years ago. You do not find the people putting up that sort of a building now. I believe in having the best ventilation you can get, but do not keep your animals too warm. We have tried that time after time.

I hope these few remarks I have made will have the effect of making you think a little more and that in that way, they will be of benefit to you.

Q.—Do you cut the hay for the horses?

A.—No, not unless we have hay that is not very good. If you are going to dampen the hay you should cut it and mix it with straw before you feed it to your horse. I do not think a man should feed extra hay to a horse unless he cuts it, dampens it and mixes it with straw.

Q.—Do you feed roots to your horse?

A.—Yes, I like to feed turnips. I do not think there is any thing much better for them.

Q.—Do you approve of watering the stock in the stable?

A.—Not as a rule, I like them to walk outside and take a drink. I have scarcely ever gone into a stable where water was continually standing in front of the cattle, but what that water was dirty, and I do not think it is a good thing, and then the animals don't get exercise. If it comes disagreeable weather we don't turn them out, but I think they should be turned out in the air and get cooled off twice a day, weather permitting. I do not believe in letting fat cattle run out too long, but I don't believe there is anything objectionable in turning them out for a short time each day. I do not believe in tying cattle up. You can feed a lot together in a big run and they will get considerable exercise.

Q.—Do you believe that feeding corn stalks dry is nearly as good as ensilage, and how do you keep the mice out?

A.—I put the corn in the barn in the fall of the year and I never have any trouble with mice. Well cured corn is as valuable as any feed we have

Q.—If you put sulphur on your corn it will keep the mice away. Don't you think corn stalks cut up make sweeter milk than ensilage?

A.—I do not know. I know it makes nice butter and good milk. I would not like to say it is better than ensilage; I really do not know.

Q.—Would you feed straw to stallions?

A.—To all horses that are not getting a lot of work I would sooner give good straw than feed hay alone; it is more easily digested.

Q.—How much more oats would you feed a horse along with straw than you would with hay?

A.—I am speaking more of feeding in the winter season and I would not give much oats anyway. Give him about a half feed of oats twice a day and plenty of good straw.

Q.—Has frozen corn anything to do with abortion?

A.—I do not know that it would, but frozen food is not good for an animal. If you have any smut in your corn that is one of the great causes

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"THE EFFECT OF STABLE VENTILATION ON THE PROFITABLE FEEDING OF BEEF CATTLE."

By J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa.

As you know, our cattle require three things before they can live. They must have food; they must have water and they must have air. How many farmers are willing to give them all the food they will eat; give them all the water they need and then cut off the air; they close the stable door as soon as they go in, they give them a drink, feed them and then go out and shut off the air and leave them that way for the rest of the night. You know that any animal deprived of air, if he should be absolutely deprived of it for a very few minutes, is a dead animal. They could live without water for a while; they could live without food for a long time, but air is the *sine qua non*, they must have air, or they cannot live.

We have not paid sufficient attention to the absolute requirement of air in our barns. It is a subject that is creating considerable stir at the present time, and many of our farmers are thinking of it to a greater extent than formerly; everybody is much more interested in it than they ever were before. We do get a great deal of air in our stables, in spite of the precautions we take to keep it out, and it is a mighty good thing that we do. We must have air or the digestive process cannot go on, and in order that the animals may do the best possible upon the food that we give them it is absolutely necessary that we furnish them with a large supply of air.

As proof of this; take the case stated by Mr. Miller where cattle were fed in a loose open barn and others fed in a tight box in a basement stable. The animals fed in the loose open barn did much the better. I have had men come to me and say, "I have fed cattle in an old barn with a few boards stuck up on the south side and no paper between, and it is remarkable that they did better than the others that I fed in a warm stable." Therefore I say, while it is important to keep our cattle comfortable and to give them every condition necessary for making gains, we must consider what we mean by comfortable conditions. Comfortable conditions are,—that they have lots of air; that they be kept dry and that they be given the right kind of food.

To illustrate this point, I want to draw your attention to an experiment which we carried on at Brandon last year. We took a bunch of steers and divided them into two lots, fed one lot in a stable fairly well ventilated, about as well ventilated as the average stable of our Ontario farmers, and another lot we fed outside without any protection except a little bit of oak scrub. The lot fed outside weighed 1,100 pound when they started about the first of December. The inside lot weighed about the same. Both lots were fed for 140 days. I think it was 138 days to be exact. The outside lot made 234 pounds gain and the inside lot 251 pounds gain, but the strange thing of all was that the outside lot did not eat quite as much food as the inside lot, and although they made less gains they made these gains at quite a bit lower price. It cost to produce 100 pounds of gain on the outside lot $5.67, and it cost to produce 100 pounds of gain on the inside lot $6.20. There is a difference of about 50 cents in favor of the cattle fed outside, in spite of the fact that they had to warm up the whole of the out-doors before they could raise the temperature and there must have been a considerable loss of heat, but in spite of this handicap the great supply of fresh air seemed to be sufficient to overcome this difficulty. I saw them myself in March, and I never saw a healthier or brighter bunch of steers in all my life, excepting possibly a lot I saw in another part of Manitoba under similar conditions.

I had the experience of feeding a bunch of fifteen steers last year during the early part of the winter at Ottawa and they made better gains during the months of November and December, when they were outside without any protection, except the shed into which they could go to sleep and in which there was hardly room for them to stay in even when stormy, and they made gains of over two pounds a day.

Just to show you the obverse of this picture I want to give you an experiment we conducted at Ottawa five or six years ago. We had a barn 35 feet wide by 42 feet long and we put into that barn some 30 head of steers. It was very poorly ventilated. We fed them there all winter, they cost us something like eight and a half cents a pound for every pound put on and they made very small gains. It was a very unsatisfactory experiment so far as profits were concerned, but it demonstrated to us that steers fed under such conditions were not likely to make a profit. Similar steers taken from the same lot fed in an adjoining building where there was good ventilation made gains of 100 pounds for from $5 to $6. We took this same building, just to prove to ourselves that it did not depend upon the building, but rather upon the lack of supply of air, we ventilated that building thoroughly and put in a lot of similar steers the next winter, and they came out just as well as the ones in our regular feeding barn, and made very much better gains than the lot that had been there the preceding year, in fact made gains for about two-thirds the cost. This proved to us conclusively that ventilation is necessary, and we introduced a most thorough system into our barns.

The methods of ventilation which we recommend are various. There is no one system that carries off first place. There are many systems of ventilation. The great difficulty I find is to get men to control or operate a system properly for I have to do with hired men who will not always look after it in the same way as a person who is interested in the cattle. The average hired man's idea of comfort for cattle is that they be kept at a high temperature; whereas the comfort of an animal lies in their having a plentiful supply of air and in being kept dry, so I have found that the greatest difficulty with any system of ventilation is to keep it working.

I introduced a certain system of ventilation in a stable three years ago and when we could persuade the men to operate it properly, things went nicely, but the moment there came a cold snap, tight went every ventilator and when it came warm again they forgot to open them again. I do not mind closing the inlets a little when it is cold, but when it comes warm they should open them up. I have known men to condemn the King system of ventilation and the reason it did not work was because they did not pay attention to it; they did not open the outlets when they should. It is nearly always from lack of attention that a system does not work. Ventilation is a thing that requires just as much attention as the feeding of the animal. It is a thing that must be attended to every day and every little while.

Just to show you how absolutely necessary it is to give attention to a system of ventilation I might mention an experience we had last winter. We put muslin curtains on a barn, 18 on each side, and when the temperature was such and such outside it was of course necessary to regulate the windows to get the right amount of air and when the temperature rose we had to open them a little more or close them up when the temperature fell outside, but we found another controlling influence which had to be reckoned with. If there was no wind blowing, then we had to open every window. If there was the least current of air then we had to close up some of the windows. I have seen every window open, the temperature outside below zero and the temperature inside around 80° Fahr. Now, that system, without the closest attention, is no good at all. We found it darkened the windows too much and was hard to control.

Another system that we have tried is the Rutherford. We found that to be as satisfactory as any we tried. We have tried the King system and under certain conditions it has worked very well, but it is apt to be neglected. It requires more attention than the Rutherford.

By the Rutherford I mean the system where the air enters at the floor and leaves at the ceiling. The King system of ventilation is where the air enters at the ceiling and leaves at the floor.

Professor King was working on the principle that the foul air consisted largely of carbonic acid gas which would be heavier than pure air and although it would rise to the ceiling at first, it would soon cool and sink to the floor. The Rutherford System goes on the principle that we must have a rapid and constant circulation of air, and to get that we must make use of the principle that the warmer and therefore fouler gases rise and the heavier ones are found at the bottom, therefore we let the heavier air in at the bottom and let the warm air out at the top and have a constant circulation. We have a barn where these two systems can be put in operation. We tried it a while with one and then with the other. We found these disadvantages. Where the air came in at the floor and went out at the ceiling the temperature was uniform. If it was 40 at the floor, it was 40 at the ceiling. We had five or six thermometers and took the reading every night or morning. In that same barn we closed up that system of ventilation and opened up the system where foul air went out at the floor and the temperature at the ceiling was ten to twelve degrees higher than on the ground and the animals were lying in the coldest air in the building. Another objection we found to it was that we had chutes to feed the horses from overhead, and the warm air got in these chutes and there was moisture precipitated and we had to abandon the King system in that stable. We are introducing it in another barn and hope to give it a more thorough trial there. The Rutherford system is thoroughly described in a bulletin issued by the Department of Agriculture for the Dominion, and can be secured by writing for it."

REPORTS OF JUDGES ON POULTRY AT THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.

By Richard Oke, London.

Orpingtons: Buff, 1st, cock, fair comb and head, good type, level even shade of golden buff, carries his color well down; 2nd, hardly as good in type and a trifle high in color; 3rd, fair type, not so even in color as those ahead. 1st hen, good size and type, nice soft shade of buff throughout, with the exception of a little smut in tail; 2nd, another good sized hen, close up in shape, not so level in top color; 3rd, fails in evenness of color. 1st cockerel, good head, nice full breast, good type, good level buff, different sections blending well together; 2nd, counterpart of first with exception of not being quite so full in breast; 3rd, nice even color throughout, hardly at his best yet, a bit young, not much form color in tail. 1st pullet, hardly up in shape, yet a good fair type, nice even top color; 2nd, not much to choose between them, fails a little in shaftiness; 3rd, another good pullet close up.

White Orpingtons: A rather small class, 1st and 2nd cocks good size and shape, fail in top color. 1st hen, nice shape and pure in color; not very much between 2nd and 3rd. 1st cockerel, good size and shape, but like the cocks, fails top color, a bit brassy; 2nd and 3rd have pretty much the same fault. 3 pullets, not much to choose between them, pure in their white and shapely.

Black Opringtons: A good big class, some nice shaped birds going down for purple barring. 1st cock, fair head and eye, nice blocky type, full breast and good color throughout; 2nd, another good shaped bird, not so good in color; 3rd, close up. 1st hen, large and shapely, a good color throughout, shown in nice fit; 2nd, good shape and color but fails in size; 3rd, nice shaped hen, hardly so pure in color. 1st cockerel, good head and comb, nice shape and flow of feather; 2nd, another good cockerel, good length of feather, carries his tail a bit gay; 3rd and 4th, close up, but not so pure in their color. 1st pullet, good shaped breast and back nice color throughout; 2nd, a good big pullet nice color a bit gone in lobes; 3rd, fails color to those in front, but is shapely.

Wyandottes: Silver, a real good class shown in nice fit. 1st cock, good shape, full breast, short back, well spread tail, nice striped hackle, with nice lacing free from frosting; 2nd, another good cock fails somewhat in lacing as does 3rd which is not so clean on back. 1st hen, splendid shape, beautifully laced throughout; 2nd, fails a bit in shape, but nicely laced; 3rd, close up. 1st cockerel, good Wyandotte shape, nice open lacing, free from frosting, good wings but a bit dirty on top color; 2nd and 3rd, about the same stamp of lacing, hardly so good in shape. 1st and 2nd pullets, very little to choose between them, good shape and beautifully laced, good in their black and free from frosting; 3rd, the counterpart of those ahead, fails a trifle in lacing on back near tail.

Golden Wyandottes: 1st cock, good shape, nice laced breast on a good ground color, fails somewhat in striping of neck and saddle; 2nd and 3rd, fails in shape and not so good in lacing. 1st hen, nice and shapely, well laced but a trifle heavy. Balance of class fails somewhat in shape. 1st cockerel fails a little in striping, nicely laced; 2nd and 3rd, not much to choose between them. 1st pullet, nice shape, good lacing, might be richer in ground color.

Partridge Wyandottes: 1st cock, good blocky type, nicely striped neck and saddle, good colored breast. 1st hen, another nice shaped Wyandotte with good pencilling throughout. 1st cockerel, nice blocky shape, about the right shaped back, might be a little richer in color; 2nd, fails size, but a good one. 1st pullet, nice shape and evenly pencilled throughout; 2nd, good pencilling but a bit dense on top and a bit long in back; balance of class a good averaged lot.

Columbians: I was rather disappointed in this class as the majority failed both in color and condition, a number of these shown in poor fit. 1st cock, a good big bird fair shape, but fails in his black. 1st hen, was better in this respect, but was shown in poor fit. 1st cockerel, best in neck striping good size moderate shape a bit off on top color. Probably the best pullet was turned down for absence of spike. 1st pullet, wins on color, not blocky enough in shape for a Wyandotte, balance of class moderate quality.

Buffs: A rather small class, with good average quality, most of the winners being a nice uniform buff and shapely. In A.O.V. Wyandotte class the Black and Silver Pencilled competed in this class and divided first honors. 1st cock and hen, both Blacks, nice shape and color, stood well out, balance of class pencilled. 1st cockerel and pullet went to the Silvers, being more shapely. 1st cockerel, a little small, but nice color throughout 1st pullet, shapely and her pencilling well defined.

Rhode Island Reds, S.C.: A nice class with good average quality. 1st cock, good size and length of body, rich even color; 2nd, fails a bit in comb and evenness of color. 1st hen, good shape and color; 2nd another good shaped hen, fails a bit on color. 1st cockerel, about the best in this variety, shapely with good top and under color; 2nd, another good one, rich underneath. Pullets, winners a nice even lot.

Rhode Island Reds, R.C.: While not so numerous as the Single Comb were shapely and good quality.

By Wm. McNeil, London.

Light Brahmas: 1st cock, a grand big one with good head and comb, splendid hackle, nice length of back, grand tail, good leg and toe feathering; 2nd and 3rd, close up to 1st. 1st hen, grand type, nice head, good comb, grand hackle, good length of back, with a splendid tail and grand leg and toe feathering; this description would do for 2nd and 3rd. 1st cockerel, a beauty with fair comb, nice head, good neck, nice back, grand tail, good leg and toe feathering; 2nd, another nice one, not as good in comb, fair hackle, a little shorter in back, not so good in tail, leg and toe feathers fair; 3rd, close up. 1st pullet, a nice one, good comb, nice head, good back, nice tail, good leg and toe feathering; 2nd, another good one; 3rd, good, but not hardly big enough. While the Light Brahma class was not a big one, I believe the quality was up to last year, and exhibit in this class won the cup for the four best birds in the Show.

Dark Brahmas: A small class. 1st cock, a little small, but good in quality, nice head, fair comb, good hackle, a little short on back, with good tail, good breast, nice leg and toe feathers; 2nd, close up. 1st hen, good, nicely pencilled and good steel grey; 2nd hen, fair. 1st cockerel a little small, quality fair; 2nd cockerel not as good in color. 1st pullet make a nice mate for 1st hen; 2nd, close up.

Buff Cochins: Were a fine class. 1st cock, grand type, nice head and comb, grand in top color all over, but not as good under, grand shaped tail, fine leg and toe feathers, an easy winner; 2nd, another good one; 3rd, close up. 1st hen, one of the best I have seen and an easy winner, she was all Cochin from head to toe, grand head and comb, nice short low neck, full hackle, and about the right length of back, extra fine in cushion, with a low tail, grand leg and toe feathers and close to the ground, uniform all over in color; 2nd and 3rd, both good ones, but a little broken in color, but both good enough to win if first had not been there, balance of class good. 1st cockerel was a beauty, nice comb, good head, nice neck and good back, splendid tail, fine cushion, grand leg and toe feathers, just a little shade high in color, but uniform all over. This will make a sure winner when an old cock. 2nd, another good one, a little larger than first and about as good in type, but hardly as good in color; balance of class good. 1st pullet, a nice mate for first hen, grand Cochin type, nice head and comb, short neck, grand hackle, good back, with fine cushion and tail, nice leg and toe feathering, uniform all over; 2nd, another good one, close up to first; 3rd, not so good in color; balance of class good.

Partridge Cochins: 1st cock, grand big Cochin, nice shape, good head and comb, nice neck, good back, nice saddle, well striped, good tail, nice leg and toe feathering, splendid colored breast; 2nd, another good one close up to first very little choice between the two; balance of class good. 1st hen, in splendid show condition and right color, not hardly big enough, but grand in quality, good head and comb, nice striped hackle, well pencilled back, good cushion, nice tail, fine leg and toe feathering, grand in fluff; 2nd, another good one close up to first, but hardly as good a mahogany color; balance of class good, 1st cockerel, a nice one about as good as first cock, nice head and comb, good striped hackle, good color, nice back, good saddle, well striped short tail, good solid block breast, nice leg and toe feathers; 2nd, close up, only hardly as good in color. 1st pullet, a beauty with fair head and comb, nice, well striped hackle, well pencilled back, grand cushion, nice tail, well pencilled fluff, good leg and toe feathers; 2nd, run close for 1st place; 3rd, good, but a little small.

Black Cochins: Were a small class, quality fair.

White Cochins: Another small class and I was sorry to see it as there is nothing nicer than a good White Cochin. What was there was good.

Black Langshans: 1st cock, was a good one, the right type, grand color, nice shape. 1st hen, was a splendid type; 2nd, another good one. 1st cockerel was a good one, mate for 1st cock, good head and comb, long neck, a little short on tail, good pair legs; 2nd, a fair bird. 1st pullet, was a good one, nice head and comb, good long neck, stood well up with a nice back, good color, nice high tail, good length of leg.

Black Javas: 1st cock, grand bird, splendid color, good shape, an easy winner; 2nd, another good one; 3rd, close up. 1st hen, a nice one, splendid color, good head and comb, nice pair of legs; 2nd, another nice one, close up to first; balance of class good. 1st cockerel, nice head and comb, good neck, with a nice long back and well carried tail, grand in color this I believe was the best bird in class; 2nd, another good one, but a little short on back; 3rd, close up; balance of class good. 1st pullet, a nice mate for first cockerel, grand shape, good length of back, good color; 2nd and 3rd, both good ones; balance of class fair.

Mottled Javas: 1st a grand big cock, well mottled and in splendid condition, an easy winner; 2nd a fair bird, but not as big. 1st hen, another good one, good mate for first cock, grand size, good shape, well mottled all over; 2nd, good, but smaller. 1st cockerel, a big fellow, an easy winner; 2nd, small, but good. 1st and 2nd, pullets, both grand, fit to win anywhere.

Black Leghorns: Was a nice class, 1st cock, fair head and comb, good ear lobes and wattles, nice length of back, carried a good tail; 2nd another fair bird close up to 1st; 3rd, about even, although a little off on comb. 1st hen, a nice little one, good head and comb, nice lobe and wattle, nice shaped neck, fair length of back, carried a good tail; 2nd, another good one, good size, but not as good in color, fair tail; 3rd, close up; balance of class all fair. 1st cockerel, a good one, nice head and comb, fair lobes, good wattles, good shaped neck, nice back, not extra good in tail, nice colored legs; 2nd, another good one, not as good in comb, good ear lobes and wattles, not as good in legs; 3rd, close up; balance of class fair. 1st pullet, was a nice little one, grand head comb and ear lobes, nice back and tail, splendid in color; 2nd, close up, would make a good mate for her; 3rd, fair ear lobes and good comb, good shape, but off in color; balance of class good.

S. C. Buff Leghorns: 1st cock, a nice one, good head and comb, fair ear lobes and wattles, nice neck, good back, nice tail, well carried, with a very light surface color, but beneath splendid; 2nd, a fair head and comb, nice neck, but too dark across the shoulders, tail nice, another fair bird. 1st hen, a good one, a splendid comb, nice wattles and ear lobes, nice length of back, good shaped tail, good even color; 2nd, another good one. fair comb, ear lobes not as good as first, and hardly as good in color; 3rd, close up to 2nd. 1st cockerel, a good one, fair head and comb, nice lobes, good neck, nice long back and fair color, good tail; 2nd, close up, not hardly as good in comb, a little shorter in back; 3rd, fair. 1st pullet, good head and nice comb, good ear lobes and wattles, nice length of back, good shaped tail, but a little off on the two top feathers; balance of class all fair.

R. C. Brown Leghorns: 1st cock, a fair bird, not extra good in comb or ear lobes, fair striped hackle, good color back and fair length, not hardly striped enough in saddle, carried a good tail; 2nd, another fair bird. 1st hen, good head, nice comb, ear lobes and wattles, good hackle, nice back, good in color, fair tail; 2nd, another fair bird, fair comb, ear lobes and wattles, a little dark on back, nice tail; 3rd, close up to 2nd. 1st cockerel was a little beauty, he was small, but as perfect as a picture, I never went passed his coop but I had to look at him, he had a fair comb, nice ear lobes and wattles, and a grand striped neck, splendid in color, nice length of back with well striped saddle, carrying a nice tail, and a good pair of legs; 2nd and 3rd, both fair. 1st pullet, was a nice mate for first cockerel, only not just as good, she had a nice comb, good ear lobes and wattles with a grand shaped back, with nice, mellow pencilling, good shaped tail; 2nd and 3rd, both fair.

A. O. V. Leghorns: White Rosecombs, 1st cock, a grand big bird, a little off on comb, good shape, carried a fine tail, and as white as snow: 2nd, another good one, but comb a little to one side; 3rd, carried his tail too high, balance of class fair. 1st hen, a good one, fair comb, good wattles and ear lobes, nice neck, good length of back, carried a nice tail: 2nd, another fair bird, not hardly as good in comb, ear lobes and wattles all right, a little short on back and on legs. 1st cockerel, a fair bird, not hardly good enough on comb, nice ear lobes and wattles, nice length of back, carried a fair tail, good length of legs; 2nd, a little off on comb and wattles, a little short on back; 3rd, close up. 1st pullet, a nice one, an easy winner, nice head and comb, good length of neck, good back, carried nice tail, good white all over; 2nd, another nice one, but hardly as good in shape as first; 3rd, fair.

Spanish: 1st cock, was a good one about as good as I have seen, face a little rough, but grand in color, with great length, good color plumage, about the right type for a Spanish; 2nd, another good one, 1st, hen, nice comb, good face, nice length and smooth, nice color plumage, good shape; 2nd and 3rd, both good. 1st cockerel, was a good one in splendid show shape, fair comb, good ear lobes and wattles, nice face; 2nd and 3rd, both close up; 1st pullet, was in best of condtion for showing, good comb, nice ear lobes and wattles, good face, good shape, and splendid in plumage; 2nd, and 3rd, both good ones. The Spanish class was as good as I have ever seen and there was very little choice between the young stock.

Andalusians: 1st cock, a nice one, fair head and wattles, good neck, nice back, nice tail, and in good show shape; 2nd, close up to first. 1st hen, a nice one, good head, nice comb, good ear lobes and wattles, she was well laced all over and uniform; 2nd, another good one, but a little too dark in lacing; 3rd, close up to second. 1st cockerel, a good one, good head and comb, nice wattles and ear lobes, nice hackle and good back, nice tail with grand laced breast; 2nd, hardly so good in comb as first, good hackle, fair back, nice tail, but not as well laced on breast; 3rd, close up to second. 1st pullet, a good one, and about the same color all over, with a nice comb, good ear lobes and wattles, well laced back, good tail, well laced breast; 2nd, fair comb, good ear lobes and wattles, a little mossy in lacing; 3rd, close up to second.

Silver Grey Dorkings: 1st cock, fair bird, nice head and comb, nice color hackle and back, nice legs and toes, carried a grand tail with good breast, 2nd, another good one, hardly as good in comb as first, a little too dark in hackle, good shaped back, nice tail, nice short legs, good toes; 3rd, had been a grand bird, but is getting old, he had lost an eye. 1st hen, fair, nice comb, good head, nice neck, good back, nice breast, nice and short on leg; 2nd, another good one, fair comb, good neck, good length of back, but a little too dark in color; 3rd, close up. 1st cockerel, a fair bird, good comb, nice ear lobes and wattles, good neck, nice length of back, nice breast, good short legs, good toes; 2nd, another nice one, hardly as good in comb, a little striped in hackle, nice length of back and good breast, not hardly as good in toes; 3rd, close up to second. 1st pullet, a good one, nice head and comb, good neck, with nice long back and good color, carried a nice tail, fair breast, good short legs with good toes; 2nd and 3rd, both good.

Colored Dorkings: 1st cock, a grand bird, good comb, nice ear lobes and wattles, nice colored neck, good back, but a little light on saddle, good breast, nice tail, good short legs, splendid toes; 2nd, a grand bird, and just as good in color, but a little too small. 1st hen, a good one, nice head and comb, good neck, grand colored back of good length, good tail, fine breast; 2nd, another good one, not hardly so long or good on back, a little better breast; 3rd, close up to second. 1st cockerel, a good one, nice head and comb, good hackle, nice back, good length, carried a nice tail, but sickles were a little white at base; 2nd, was a nice one with fair head and comb, good hackle, not so long on back as first; 3rd, close up to second. 1st pullet was the best in the class, nice head and comb, splendid neck, good colored back, nice length, grand colored tail, good breast, nice short legs with good toes; 2nd, another good one, about as good as first, but lacking in size; 3rd, another good one but not so good in color.

White Dorkings: Were a small class, 1st cock, a fair bird; 1st and 2nd hens, both good. 1st, 2nd and 3rd, cockerels fair; also pullets, there is room for improvement in this class.

Houdans: 1st cock, a grand bird, splendid size, good color, a shade light, with a nice crest and beard, good long back, carried a nice tail; 2nd, another good one, but a little small; 3rd, close up. 1st, was a grand hen, nice color all over, with a nice crest and beard, good length of back with deep body, the right length of leg well toed; 2nd, another good one, but a little undersized not hardly so good in crest or beard; balance fair. 1st cockerel, a nice one, good crest and beard, nice shaped back, grand in color, good depth, and will make a grand old cock; 2nd and 3rd, both good ones; balance of class fair. 1st pullet, a nice one, splendid color, with nice crest, good beard, nice length of back, good shape; 2nd, another one close up to 1st, not much between them; 3rd, not as good crest or beard; balance of class fair.

Creve Coeurs: 1st cock, a nice one, good crest, nice color, good back, nice shape; 2nd, close up. 1st hen, a good one, fine crest, good length of back, grand in color; 2nd, a good one, but loses to first on color; 3rd, close up to second. 1st cockerel, fair bird, nice crest, good shape, nice color; 2nd and 3rd, close up. 1st pullet, a nice one, good crest, nice shape, good color; 2nd close up to first.

La Fleche: 1st cock, a good one, nice head and comb, wattles and ear lobes, good color, nice shape; 2nd, close up. 1st hen, good comb, wattles and ear lobes, nice color, good length of back; 2nd and 3rd, both good. 1st cockerel a nice one, good head, nice comb, fair ear lobes and wattles, nice long back, good color; 2nd, another fair bird. 1st pullet, good comb, fair ear lobes and wattles good length of back, nice color; 2nd hardly as good in comb; 3rd, close up.

Faverolles: This is a small class, and it is a pity some of the breeders do not take hold, as they are a good variety.

Black Hamburgs: A fine class, 1st cock, a good one, fit to win anywhere, nice head and comb, good ear lobes, with a nice shaped, good-colored back, with a grand tail, fine color nice breast; 2nd, another good bird, but hardly in good condition for showing; 3rd, nice colored bird, but very rough about the head; balance of class fair. 1st hen, a good one, nice head and comb, good color, an easy winner; 2nd, another fair one with good comb, ear lobes and wattles, but off in color; 3rd, a grand hen, but off in color; balance fair. 1st cockerel, a fair bird, but not in good show shape; 2nd, about as good, only a little light colored in legs. 1st pullet, a good one, nice head, comb and ear lobes; 2nd another fair bird; 3rd, a fine big pullet, but had been shown too much so that her comb had grown and went over.

G. P. Hamburgs: 1st cock, a nice one, good head, comb and nice ear lobes, splendid in shape, grand in color, with a nice, well laced tail; 2nd, another good one, but a little too short on legs made him look too blocky. 1st hen, was a grand one, the same color all over, very finely pencilled; 2nd and third were too coarse in pencilling. 1st cockerel, was a mate to first cock, nice head and comb, grand in color with a good, well laced tail; 2nd and 3rd, both fair. 1st and 2nd pullets, both good birds and just mates for first hen.

S. P. Hamburgs: 1st cock, a good one, nice color with a grand laced tail; 2nd, was pullet bred. 1st hen, a good one; 2nd and 3rd, were both cockerel bred. 1st cockerel, a nice one, good head, comb and ear lobes, with a nice laced tail; 2nd and 3rd, both pullet bred. 1st and 2nd pullets, both grand ones; 3rd, was cockerel bred.

G. S. Hamburgs: 1st cock, fair bird, nice comb, good ear lobes, nice back, good tail, fair breast; 2nd, not so good on comb or ear lobes; 3rd, close up to second. 1st hen, a grand one, about as good as I have seen anywhere; 2nd and 3rd, both good. 1st cockerel, was a grand big bird, full-grown, with a good comb, nice ear lobes and wattles; 2nd, a nice little one, hardly old enough, I believe will make a grand old cock bird. The Golden Spangled hen won the special for best female in Hamburg class. she is a grand hen. 1st and 2nd pullet, both good, not much choice between them.

S. S. Hamburgs: A grand class, 1st cock, I think as good an S. S. as I have seen for years, he won at Guelph, and it would take a good one to beat him; 2nd, another good one, but not quality of first; balance fair. 1st hen, a good mate for first cock, I believe she won first at Boston and the Ontario. The two hens that should have been second and third I had to leave out for feathers between toes, I felt sorry to have to do so, the ones that went in were poor. 1st cockerel, was a nice one, a little out of condition, he had two lumps in his face, seemed to me roup or a cold had settled there; 2nd and 3rd, fair birds the 3rd prize one would make a grand pullet breeder, he had the right shaped spangle and good color. 1st pullet was a nice one and would make a mate for the one that won at Guelph; 2nd and 3rd, fair.

Red Caps: Were a small class, but as good as I ever saw.

OFFICERS AND COMMITTEES FOR EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909-10.

OFFICERS.

President,—PETER WHITE, Pembroke.

Vice-President,—JOHN BRIGHT, Myrtle.

Secretary-Treasurer,—D. T. ELDERKIN, Parliament Buildings, Toronto.

Board of Directors.—Peter White, Pembroke; John Bright, Myrtle; J. H. Grisdale, Ottawa; John Gardhouse, Highfield; W. F. Stephen, Huntingdon, Que.; W. A. Wallace, Kars; N. F. Wilson, Cumberland; R. Richardson, South March; Andrew Whitelaw, Guelph; P. O. Collins, Bowesville; D. C. Flatt, Millgrove; J. C. Smith, Ottawa; W. H. McNish, Lyn; Geo. Robertson, Ottawa; John A. Belford, Ottawa; Geo. Higman, Ottawa; W. F. Garland, Ottawa; Wm. Smith, Columbus; Dr. R. E. Webster, Otawa; J. J. Black, Winchester; A. P. Westervelt, Toronto.

Executive Committee.—The President, Vice-President, J. H. Grisdale, Geo. Robertson, J. C. Smith, A. P. Westervelt.

Committee on Horses.—John Bright, Myrtle; Wm. Smith, Columbus; Dr. R. E. Webster, Ottawa; J. J. Black, Winchester; Jas. K. Paisley, Ottawa; Ambrose Shawville, Que.; B. Rothwell, Ottawa; J. W. Allison, Morrisburg; Robert Hunter, Jr., Maxvile; Geo. Hay, Lachute, Que.

Committee on Cattle.—J. H. Grisdale, Ottawa; John Gardhouse, Highfield; N. F. Wilson, Cumberland; Peter White, Pembroke; Thos. McDowell, Shawville, Que.; Hon. W. C. Edwards, Rockland; T. J. Graham, Mosgrove; W. F. Stephen, Huntingdon, Que.; R. Richardson, South March; Samuel McLelland, Beachburg.

Committee on Sheep.—W. A. Wallace, Kars; N. F. Wilson, Cumberland; R. Richardson, South March; Andrew Whitelaw, Guelph; R. R. Sangster, Lancaster; Geo. Bradley, Carsonby; John Barr, Dunmore.

Committee in Swine.—P. O. Collins, Bowesville; D. C. Flatt, Millgrove; J. C. Smith, Ottawa; J. H. Grisdale, Ottawa; David Barr, Jr., Renfrew; W. H. McNish, Lyn; A. H. Foster, Twin Elm.

Dairy Committee.—W. F. Stephen, Huntingdon, Que.; J. H. Grisdale, Ottawa; N. Sangster, Ormstown, Que.; W. H. McNish, Lyn; Jos. Meilleur, Ottawa; R. R. Ness, Howick, Que.; Sen. D. Derbyshire, Brockville; P. Clark, Ottawa.

Committee on Poultry.—Geo. Robertson, Ottawa; John A. Belford, Ottawa; A. W. E. Hellyer, Ottawa; Geo. Higman, Ottawa; W. F. Garland, Ottawa; F. J. Blake, Almonte; W. H. Carleton, Ottawa; F. C. Elford, McDonald College, Que.; D. McKellar, Hawkesbury.

Committee on Seeds.—T. G. Raynor, Ottawa; Geo. Boyce, Merivale; B. Rothwell, Ottawa; G. F. Bradley, Carsonby; J. C. Stuart, Dalmeny; G. H. Clark, Ottawa; L. H. Newman, Ottawa; Osborne Wright, Beachburg.

Reception Committee.—Peter White, Pembroke; His Worship the Mayor of Ottawa; H. F. McGivern, M.P., Ottawa; A. E. Fripp, M.P.P., Ottawa; G. H. Higman, Ottawa; Fred Cook, Ottawa.

FINANCIAL STATEMENT

OF THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW TO MARCH 31ST, 1909.

RECEIPTS.

Cash on hand, December 31, 1907	$2,680 19	
Legislative Grant	7,321 00	
Entry Fees	2,718 75	
Gate Receipts and Farmers' Institute Fees	1,045 85	
Sale of Carcasses and Hides	2,023 48	
Live Birds Sold	196 50	
Canadian Ayrshire Association, through Dominion Cattle Breeders' Association, special prizes	32 50	
Holstein-Friesian Association, special prizes	140 00	
Shorthorn Breeders' Association, through Dominion Cattle Breeders' Association, Grant	135 00	
Yorkshire Swine Breeders' Society, Grants	100 00	
Berkshire Swine Breeders' Society, Grant	20 00	
Dominion Swine Breeders' Association, Grants	150 00	
Canadian Clydesdale Horse Association, Grant	400 00	
Special Cash Prizes	162 50	
Special Cash Prizes to be awarded 1910	42 00	
Advertising space in prize list and building	130 00	
Memberships received with entry fees	4 00	
Sale of Catalogues	11 65	
Miscellaneous	7 55	
		$17,320 97

EXPENDITURES.

Directors' Expenses	$ 91 28	
Postage and Stationery	186 22	
Printing	685 15	
Advertising	1,513 14	
Office Expenses and Help	338 45	
Telegraph, Telephone and Express	120 59	
Judges, Judges' Clerks and Lecturers	706 75	
Superintendents and Assistants	1,108 85	
Dressing Carcasses, Block Test	47 00	
Prize Money	8,923 25	
Carcasses	2,023 38	
Sale of Birds in Sale Class	193 50	
Freight Refunds	360 60	
Refunds Entry Fees	55 25	
Special Exhibits of Live Stock, 1908	225 00	
Reporting Meetings	150 00	
Straw and Shavings	185 09	
Poultry Supplies including Feed	97 44	
Lighting Building	115 20	
Heating Building	420 33	
Fitting Building	89 69	
Dairy Test	40 00	
Lunch Room	60 70	
Rent of Cots	15 00	
Music	122 00	
Payments to Farmers' Institute Secretaries	12 30	
Express on Poultry Coops	36 40	
Insurance on Poultry Coops	11 25	
Live Stock Memberships	4 00	
Auctioneer	10 00	
Auditor	9 00	
Miscellaneous	7 87	
		$17,964 68
Balance due Treasurer		$643 71

Examined and found correct,
this 27th day of April, 1909.
(Signed) W. G. LINDSEY,
Auditor.

(Signed) PETER WHITE,
President.
(Signed) D. T. ELDERKIN,
Treasurer.

ONTARIO HORSE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The annual meeting of the Ontario Horse Breeders' Association was held in Room "G," King Edward Hotel, Toronto, on Friday, January 15th, 1909 at 9.30 a.m.

The President, Wm. Smith, occupied the Chair.

It was moved by John Bright, seconded by James Henderson,—"That the minutes of the previous meeting be taken as read." Carried.

REPORT OF THE EXECUTIVE.

The Secretary then read the following report of the Executive Committee to the members of the Association:

The Horse Breeders' Association has now entered upon its third year as an organization. During that time two exhibitions have been held, the third being conducted at the present time. Each of these shows have been very successful, being well patronized by the breeders and owners and great interest being taken by the Agricultural community generally, as shown by the large attendance each day during which the exhibitions were held.

The Exhibitions this year is being held at the Union Stock Yards in West Toronto. It was considered by the Directors that in order that full advantage could be taken of having the large number of high-class breeding horses brought together, there should be an opportunity given to the visitors to inspect the horses at other times than when the prizes were being awarded. In order to do this it was necessary times than when the prizes were being awarded. In order to do this it was considered necessary to have well lighted stabling accommodation connected with the Exhibition Arena. During the past year the Union Stock Yards Company made a favorable proposition to provide the necessary accommodation both as to stables and exhibition building for the 1909 Show. After giving the matter careful consideration, it was decided to accept the accommodation offered, and everything possible has been done by the management of the Stock Yards Company to assist in the success of the Show.

The number of entries in the various classes are as follows:

Clydesdales, (Open Class)	66
Canadian-Bred Clydesdales and Shires	34
Shires, (Open Class)	15
Hackneys	10
Standard Breds	12
Thoroughbreds	12
Ponies	9
Heavy Draughts	22
	180

MEMBERSHIP.

The Membership for 1908 was made up as follows:

Canadian Clydesdale Association	359
Canadian Shire Association	11
Canadian Hackney Society	9

For 1909 the membership of the Association is.

Canadian Clydesdale Association	216
Canadian Hackney Association	11
Canadian Shire Association	20
Canadian Thoroughbred Association	12

This will provide for the following Directors:

Clydesdales	5
Shire	2
Hackney	2
Thoroughbred	2

Owing to the name of the representative from the Ontario Horse Breeders' Association to the Canadian National Exhibition being required to be sent to the Exhibition Association before the 10th of January, the Executive appointed the President to represent this Association. This appointment should be confirmed and the representative for 1910 should be appointed.

During the past year it was decided to hold a Horse Show in connection with the Eastern Ontario Live Stock and Poultry Show at Ottawa. The Board of Directors of that Association have previously been nominated by the Cattle, Sheep and Swine Breeders' Associations, which Associations nominate members residing in the eastern part of the Province, in addition to their Presidents, who are members of the Exhibition Association by virtue of their office. The Ontario Horse Breeders' Association will therefore be entitled to nominate two representatives to this Board for 1910. The coming Exhibition will be held next week, January 19th to 22nd. Well heated and well lighted stable and ring accommodation has been provided, the complete show being held under one roof, having 70,0000 feet of floor space, equal to a building 600 feet long by 120 feet wide. Entries for horses will be accepted up to January the 15th.

At the session of the Legislature of 1908, there was appropriated $20,000 to erect an addition to the Winter Fair building at Guelph to provide more accommodation for the live stock and poultry at present exhibited and also to provide stabling accommodation and an arena for horses. This amount was supplemented by a grant of $10,000 by the City of Guelph. When tenders were called for, it was found that several thousand dollars more would be required and it was decided to allow the matter to stand over to try and procure additional funds from some other source.

In June of 1908, notice was given by the Railroad Companies of the withdrawal of the privileges of partial unloading out of cars shipped to the western Provinces of pure-bred breeding stock consigned to different points along the direct route to the destination. This privilege had previously been allowed upon payment of a shunting charge of $2. This would materially prevent the shipment of stock to the west except when sold in car-loads, and as the chief trade in pure-bred stock between Ontario and the west is made up of sales of smaller lots than car-loads, these smaller lots could not be delivered except at almost prohibitive rates. This matter was considered to be so vital to the breeders of pure-bred stock, that it was decided to have the President of this Association, together with representatives of other Associations, the Minister of Agriculture and the Dominion Live Stock Commissioner, go to Montreal to ask the Railroad Officials to reconsider the regulation. The mission, we are glad to report, was entirely successful.

Notice was also given by the Railway officials that the exhibition privileges given to horses shows entitling unsold exhibits to free return, were to be withdrawn. This it was considered would so materially affect the shows at West Toronto and the coming show at Ottawa, that it was decided it would be wise to use every means possible to have the exhibits returned free. A committee was therefore appointed, and an appointment made with the traffic officials at Montreal and it was agreed by them to postpone the date at which the order was to come into effect. Unsold exhibits will therefore be returned free as previously.

Owing to the general provincial elections which were held during the past year, it was not considered opportune to urge upon the Government the recommendations suggested at our last annual meeting, regarding a system of inspection of stallions. It is also felt that since that time the question will have been considered by those interested and possibly some new ideas may have been suggested. It is therefore recommended that this matter should be further discussed and that perhaps a bill along this line should be drafted and submitted to the Minister of Agriculture with a request to have it submitted during the present year to breeders and all others interested, with the object of having the various clauses thoroughly discussed and clearly understood and in this way to know everything which could be said in favor of such a bill and everything whilh could be brought out against it.

The financial statement for the year ending December 31st, 1908, is as follows:

FINANCIAL STATEMENT OF THE ONTARIO HORSE BREEDERS' ASSOCIATION.

For the Year Ending December 31st, 1908.

Receipts.

Legislative Grant	$2,800 00
Grant, Canadian Clydesdale Association	1,300 00
Grant, Canadian Hackney Association	100 00
Grant, Canadian Shire Association	50 00
Grant, Canadian Pony Society	25 00
Membership, Canadian Clydesdale Association	20 00
Membership, Canadian Shire Association	15 00
Membership, Canadian Hackney Association	15 00
Entry Fees	502 40
Gate Receipts	787 50
Sale of Catalogues	67 90
Advertising in Prize List	147 00
Miscellaneous	30
	$5,830 10

Expenditures.

Balance due Treasurer, January 1st, 1908	$ 28 85
Postage and Stationery	55 50
Printing and Advertising	713 37
Office Help	21 50
Telegraph and Telephone	34 47
Interest and Exchange	14 00
Directors' Expenses	148 75
Judges' Fees and Expenses	262 35
Superintendent and Assistants	229 80
Rent of Show Building	500 00
Fitting building, and Material for Ring	184 81
Heating Building	255 05
Band	110 00
Prize Money	3,049 00
Entry Fees Refunded	4 00
One half, Special Horsemen Dinner	213 85
Commission on Advertising Prize List, 1909	30 25
	$5,855 55
Balance due Treasurer	25 45

Audited and Found Correct,
this 14th day of January, 1909.
(Signed) G. de W. Green,
Auditor.

All of which is respectfully submitted:

Wm. Smith. J. M. Gardhouse.
John Boag. Jas. Henderson.
John Bright. A. P. Westervelt.

It was moved by William Smith, seconded by John Boag,—"That the report of the executive as read be adopted." Carried.

It was moved by John Bright, seconded by James Henderson,—"That the appointment of the President, Wm. Smith, by the Executive, as the representative of the Ontario Horse Breeders' Association for 1909 to the Canadian National Exhibition be confirmed." Carried.

It was moved by John Boag, seconded by John Gardhouse,—"That the first paragraph of Article 3 of the Constitution be amended as follows:

The members shall consist of the members of the following Associations residing in the Province of Ontario, who have recorded at least one pedigree as breeder or importer during the two proceeding calendar years, provided Article 4 has been complied with." Carried.

It was moved by John Bright, seconded by J. M. Gardhouse,—"That the following section and sub-sections be added to Article 3 of the Constitution:

(*d*) Joint stock companies qualifying for membership from any record association may nominate one or two of the officers of the company for members of this Association, and if the Secretary of the company forwards to the Secretary of this Association the names and addresses of the said nominees (or nominee) on or before the 10th day of January of each year, they shall be members of this Association.

Any advertised partnership firm qualifying for membership in this Association from any record Association, shall be entitled to two members, if, on or before the 10th day of January of each year such advertised partnership firm notifies the Secretary of this Association of the names and addresses of the two members of the firm who will act as representatives of the said partnership firm.

Provided,—

1. That in case no nomination is made as provided in the section above, by any one advertised partnership firm or joint stock company, the said firm or company shall only be entitled to one membership in this Association.

2. That if at any time during a meeting there is any dispute as to the proper representative from any advertised partnership firm or joint stock company, the matter shall be referred to the presiding officer whose decision shall be final; if a dispute should arise at any other time the matter shall be referred to the Executive whose decision shall be final.

3. That not more than one member of one firm or more than one representative of a joint stock company, shall be eligible to the office of director." Carried.

It was moved by R. E. Gunn, seconded by John Boag,—"That the drafting of the bill regarding a system of inspection of stallions be left in the hands of the Executive of the Ontario Horse Breeders' Association to be dealt with, immediately or as soon thereafter as possible, with a view to laying the same before the Minister of Agriculture at the earliest possible moment, and that Messrs. J. J. Dixon and Geo. Pepper be asked to confer with the Executive in regard to the drafting of the same." Carried.

The election of Directors resulted as follows:

From Canadian Clydesdale Association.—A. G. Gormley, Unionville; John Bright, Myrtle; Walter Renfrew, Toronto; Thomas Graham, Claremont; James Henderson, Belton; Wm. Smith, Columbus; R. E. Gunn, Beaverton; A. E. Major, Whitevale.

From Canadian Shire Association.—J. M. Gardhouse, Weston; John Gardhouse, Highfield.

From Canadian Hackney Society.—E. C. H. Tisdale, Beaverton; John A. Boag, Queensville.

From Canadian Thoroughbred Association.—Wm. Hendrie, Hamilton; Dr. R. E. Webster, Ottawa.

From Canadian Pony Society.—J. G. Hanmer, Brantford.

Representatives to Fair Boards:

Canadian National Exhibition.—Wm. Smith, Columbus.

Western Fair.—Wm. Mossip, St. Marys'; O. Sorby, Guelph.

Eastern Ontario Live Stock and Poultry Show.—Dr. R. E. Webster, Ottawa; J. J. Black, Winchester.

(*A list of members is published in the Appendix to this Report.*)

ONTARIO HORSE BREEDERS' EXHIBITION.

HELD AT UNION STOCK YARDS, WEST TORONTO, ON JANUARY 13TH TO 15TH, 1909.

LIST OF PRIZE WINNERS.

Clydesdale Stallions foaled previous to Jan. 1, 1905.

1st—Sir Marcus (imp.) [7790] (13205), bay, ratch on face, white legs, foaled 1903. Bred by Wm. Burns, Bowfield, Scot. Exhibited by Graham Bros., Claremont Ont.; sire, Sir Simon [5406] (10465); dam, Bowfield [13878] (18569), by Breadalbane (1978).

2nd—President Roosevelt (imp.) [7759] (13651), bay, face and legs white, foaled May 1st, 1902. Bred by Matthew Marshall, Bridgebank, Stranraer, Scot. Imported and exhibited by Smith & Richardson, Columbus, Ont.; sire, Marcellus [4683] (11110); dam, Young Swallow [5299] (13535), by Excelsior [4191] (5751).

3rd—Duke of Malton (imp.) [7768] (12947), black, blaze, four white legs, foaled 1903. Bred by Wm. Watson, Millom Castle, Millom, Eng. Imported and exhibited by Smith & Richardson, Columbus, Ont.; sire, Sir Everest [4840] (10917); dam, Nell of Millom Castle [10031] (15335), by Londonderry [3930] (7934).

4th—Debonair (imp.) [8776] (12937), brown, ratch, four white legs, foaled July 26th, 1903. Bred by James Stewart, Corscaplie, Dunblane, Perthshire, Scotland. Imported and exhibited by J. F. Elliott, Oxford Centre, Ontario; sire, Hiawatha [3430] (10067); dam, Madge Carruchan [3980] (12934), by Prince Carruchan [6679] (8151).

5th—Marchfield Baron (imp.) [8432] (13629), brown, foaled 1904. Bred by Robert Wilson. Exhibited by Dalgety Bros., London, Ontario; sire, Prince Shapely [3094] (10111); dam, Marchfield Dora [15665] (17698), by Macmeekan [7001] (9600).

6th—Ardnahoe (imp.) [4501] (12804), brown, stripe on face, four white legs, foaled May 1st, 1904. Bred by Mrs. Ferguson, Ardnahoe, Bute, Scotland. Imported and exhibited by John A. Boag & Son, Ravenshoe; sire, Pride of Blacon [4072] (100837); dam, Arran Lily [6564] (15495), by Mountain King [4973] (7074).

7th—Culdrain Prince (imp.) [6148] (12517), brown, blaze, near hind foot white, foaled March 29th, 1902. Bred by Lieut-Col. C. G. Gordon, Culdrain, Gartley, Scotland. Imported and exhibited by T. H. Hassard, Markham, Ontario; sire, Prince Thomas [4028] (10262); dam, May of Culdrain (12489), by MacLennan [4910] (6048).

8th—Sir Henry (imp.) [6104] (13200), bay, foaled 1904. Bred by A. M. Gregory. Exhibited by Smith & Richardson, Columbus; sire, Prince Thomas [4028] (10262); dam, Gem [9186] (16116), by Primate [4058] (10099).

9th—Brave Nelson (imp.) [8786] (12872), black or very dark brown, small white mark on forehead, foaled 1903. Bred by G. & C. Nelson, Stockbridgehill, Ecclefechan, Dumfreisshire, Scotland. Imported and exhibited by T. H. Hassard. Markham, Ont.; sire, Prince Tom [4145] (11149); dam, Jess of Stockbridgehill [16495] (16982), by Raeburn [6345] (9833).

Clydesdale Stallions foaled in 1905.

1st—Black Ivory (imp.) [7761] (13367), black, white face, hind legs and off forefoot white, foaled April 19th, 1905. Bred by James Durno, Jackstown, Rothie, Norman, Scotland. Imported and exhibited by Smith & Richardson; sire, Everlasting [5346] (11331); dam, May Blossom [10365] (16058), by Prince Thomas [4028] (10262).

2nd—Buttress (imp.) [6812] (13392), bay, white hairs, face and legs white, foaled May, 1905. Bred by Mrs. Gall, Smiddyburn, Rothie-Norman, Aberdeenshire, Scotland. Imported and exhibited by John A. Boag & Son, Queensville, Ontario; sire, Everlasting [5346] (11331); dam, Lady Rose [14570] (17659), by Gold Mine [2904] (9540).

3rd—Baron Laird (imp.) [8445] (13335), brown, face and legs white, foaled May 23rd, 1905. Bred by John McDowall, Girdstingwood, Kircudbright, Scotland. Imported and exhibited by Graham Bros., Claremont; sire, Baron's Pride [3067] (9122); dam, Trilby of Girdstingwood, [15730] (16845), by Woodend Gartly [3847] (10663).

4th—First Baron (imp.) [6413] (13477), bay, blaze, four white legs, foaled 1905. Bred by James Hamilton, Drumburle, Ayr, Scotland. Imported and exhibited by T. H. Hassard, Markham, Ontario; sire, Hiawatha [3430] (10067); dam, Jean of Drumburle [9879] (vol. 29, page 10, S.), by Triumph [6414] (9864).

5th—Craignair (imp.) [7793] (13850), brown, stripe on face, off hind ankles white, little white on near hind hoof-head, foaled 1905. Bred by Geo. Baird, Meikle Farm, Dalbeattie, Scotland. Imported and exhibited by Graham, Renfrew & Co., Limited, Bedford Park, Ontario; sire, Lothian Again [7430] (11804); dam, Mall 2nd [13880] (13691), by Mactopper [2800] (8831).

6th—Meaburn King (imp.) [8806] (14556), black, blaze, off foreleg white, white on knee, hind legs white, foaled 1905. Bred by Thomas Winter, Meaburn Hall, Shap, Westmorland, England. Imported and exhibited by T. H. Hassard, Markham, Ont.; sire, Montrose Prince [8810] (11834); dam, Mabel [16480] (18516), by Zadkiel [2424] (10482).

7th—Inheritor (imp.) [7765] (13855), brown, foaled 1905. Bred by Ferrier Pace. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Hiawatha [3430] (10067); dam, Buchlybie Bell [13801] (18124), by Cassabianca [4843] (10523).

8th—Squire 8th (imp.) [6810] (13786), brown, star, hind legs and off forefoot white, foaled May 22nd, 1905. Bred by Allan Murray, Castlemilk Mill, Lockbie, Scotland. Imported and exhibited by John A. Boag & Son, Queensville; sire, Ascot [3942] (10494); dam, Rose o' the Mill [14568] (18095), by Royal Standard [4020] (9847).

9th—Imperialist Junior (imp.) [8768] (14169), bay, face and legs white, foaled March 28th, 1905. Bred by Grant & Douglas, Balliemore, Nethybridge, Scotland. Imported and exhibited by Neil Smith, Brampton, Ontario; Sire, Imperialist [7687] (11376); dam, Lady Anne [16434] (16108), by Scottish Prince (9673).

Clydesdale Stallions foaled in 1906.

1st—Top Spot (imp.) [7795] (13848), bay, white face, hind legs and near forefoot white, foaled May 25th, 1906. Bred by A. & W. Kerr, Old Graitney, Gretna, Scotland. Imported and exhibited by Graham, Renfrew & Co., Limited, Bedford Park, Ontario; sire, Baron Hood [6137] (11260); dam, Lady Stormont [13886] (16157), by Darney Again (9182).

2nd—Dunure Nikko (imp.) [8792] (14102), bay, white, face, four white legs, foaled May, 1906. Bred by Daniel Henderson, Netherton, Langbank, Renfrewshire, Scotland. Imported and exhibited by T. H. Hassard, Markham, Ontario; sire, Hiawatha [3430] (10067); dam, Nellie 2nd of Netherton [15997] (15082), by Prince of Albion [2895] (6178).

3rd—Dunure Pebble (imp.) [8461] (14104), brown, foaled 1906. Bred by T. J. Gardiner. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Baron o' Buchlyvie [5353] (11263); dam, Lily of Banchory [15740] (17662), by Marcellus [4683] (11110).

4th—Dunure Robert (imp.) [8020] (13870), bay, foaled 1906. Bred by Wm. Dunlop. Exhibited by T. H. Hassard, Markham, Ontario; sire, Montrave Mac [3087] (9958); dam, Montrave Minosa [14901] (17582), by Montrave Ronald [5328] (11121).

5th—Prince Ascot (imp.) [8458] (14485), black, foaled 1906. Bred by A. R. Johnston. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Ascot [3942] (10494); dam, Mag of Lockwood [15739] (16773), by Prince of Princes [7096] (9088).

6th—Timothy (imp.) [6811] (13852), bay, face, near fore and hind legs white, foaled June, 1906. Bred by James McAdam, Slogarrie Mains, New Galloway Station, Scotland. Imported and exhibited by John A. Boag & Son, Queensville, Ontario; sire, Benedict [3604] (10315); dam, Slogarrie Pearl [14576] (14671), by Prince Robert [2891] (7135).

7th—Gay Sprig (imp.) [7794] (13849), bay, foaled 1906. Bred by Robert Dick. Exhibited by W. J. Cowan, Cannington, Ontario; sire, Refiner [5418] (12301); dam, Lady Favorite [13882] (17552), by Royal Favorite [4052] (10630).

8th—Abbots Hall (imp.) [8736] (13947), brown, white hair through coat, stripe, hind legs white, fore legs gray, foaled May 15th, 1906. Bred by Wm. Cummings, Dogton, Kinglassie, Fifeshire, Scotland. Imported and exhibited by T. D. Elliott, Bolton, Ontario; sire, Montrave Merman [8735] (11437); dam, Dogton Lady [16377] (20987) by Prince Harold [4492] (9973).

9th—Dunure Allan (imp.) [8456] (14487), brown, face and legs white, foaled May 22nd, 1906. Bred by Wm. Dunlop, Dunure Mains, Ayr, Scotland. Imported and exhibited by Smith & Richardson, Columbus, Ontario; sire, Dunure Freeman [7067] (11693); dam, Mayflower [15737] (15317), by Lord Lothian [3513] (5998).

Clydesdale Stallions foaled in 1907.

1st—Dunure Wallace (imp.) [8455] (14488), bay, foaled 1907. Bred by Wm. Dunlop. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Baron o'Buchlyvie [5353] (11263); dam, Dunure Anna [15736] (16645), by Montrave Mac [3087] (9958).

2nd—Huntly Pride (imp.) [8460] (14483), brown, foaled 1907. Bred by Chas. Smith. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Ruby Pride [7201] (12344); dam, Rosabella [6930] (12921), by Lord Montrose [3568] (7973).

3rd—Lord Banchory (imp.) [8441] (14478), bay, face and near hind ankle white, foaled April 20th, 1907. Bred by James Leask, Mains of Glenfarquhar, Auchinblae, Fordoun, Scotland. Imported and exhibited by J. M. Gardhouse, Weston, Ontario; sire, Netherlie [8324] (12260); dam, Lorna Doon [15701] (15122), by Bounding Boy [8442] (10172).

4th—Captain Kettle (imp.) [8747] (14540), bay, star, near fore ankle and hind legs white, foaled May, 1907. Bred by A. W. Saunders, Dromore Farm, Kircudbright, Scotland. Imported and exhibited by T. D. Elliott, Bolton, Ontario; sire, Ascot [3942] (10494); dam, Trilby of Kowle [16394] (20889), by Darnely's Hero [7997] (5697).

Clydesdale Mares foaled Previous to January 1st, 1906.

1st—Maid of Athens (imp.) [15708] (20834), light brown, stripe, three legs white, one leg dark, foaled June 5th, 1905. Bred by Mrs. Sarah Gillies, Quochag, Rothesay, Bute, Scotland. Imported and exhibited by Graham Bros., Claremont; sire, Royal Blend [6041] (11893); dam, Sally of Quochag [15711] (17675), by Prince Rosemount [5345] (9992).

2nd—Floshend Princess (imp.) [13788] (18613), bay, white on face and legs, foaled May, 1904. Bred by James Crawford, Floshend, Gretna, Scotland. Imported and exhibited by Smith & Richardson, Columbus, Ontario; sire, Prince Tom [4145] (11149); dam, Lily of Flosh [13816] (18614), by Williamwood [3939] (8391).

3rd—Crosby Gem (imp.) [13867] (18570), bay, foaled 1905. Bred by Wm. Threlfell. Exhibited by W. J. Cowan, Cannington, Ontario; sire, Baron's Fashion [6247] (10973); dam, Jess of Crosby [13869] (18571) by Baldarie Chief [6305] (10025).

Clydesdale Mares foaled in 1906.

1st—Queen of the Waves (imp.) [15710] (20835), bay, face and legs white, foaled May 19th, 1906. Bred by John Cooper, Ley, Banchory, Scotland. Imported and exhibited by Graham Bros., Claremont, Ontario; sire, Netherlea [8324] (12260); dam, Mary of Ley [15720] (17485), by Gay City [7374] (10194).

2nd—Bishopton Queen (imp.) [14072] (18596), bay, stripe, near fore and near hind ankles white, foaled May, 1906 Bred by John Currie, Bishopton, Kircudbright, Scotland. Exhibited by Hodkinson & Tisdale, Beaverton, Ontario; sire, Prince Sturdy [2881] (10112); dam, Maggie [14402] (18597), by Baron's Pride [3067] (9122).

3rd—Craigie Beauty (imp.) [14804] (18742), brown, stripe, four white legs, foaled May, 1906. Bred by Alex. Anderson, Berryhill, Dundee, Scotland. Imported and exhibited by T. D. Elliott, Bolton, Ontario; sire, Royal Blend [6041] (11893); dam, Black Beauty [14813] (16471), by Crown and Feather [4643] (8559).

4th—Rose Campbell (imp.) [14566] (18582), bay, white face and four white legs, foaled 1906. Bred. by John Campbell, Slagnaw, Castle Douglas, Scotland. Imported and exhibited by John A. Boag & Son, Queensville, Ontario; sire, Benedict [3664] (10315); dam, Bell of Auldbrick [14574] (18581), by King of the Roses [3493] (9927).

Clydesdale Mares foaled on or subsequent to January 1st, 1907.

1st—White Heather [14617], bay, face and off hind leg white, foaled June 1st, 1907. Bred and exhibited by A. G. Gormley, Unionville, Ontario; sire, Fullarton (imp.) [2370] (9910); dam, Miss Todd (imp.) [4785] (Vol. 25, page 85, S.), by King's Cross [3153] (10070).

2nd—Lady Baronson (imp.) [15707] (20833), brown, white face, four white legs, foaled May 26th, 1907. Bred by James Dick, Ballinton, Kippen Station, Stirlingshire, Scotland. Imported and exhibited by Graham Bros., Claremont, Ontario; sire, Baronson [5347] (10981); dam, Rosie of Ballinton [15716] (19371), by Royal Gartly [2859] (9844).

Canadian Bred Clydesdale and Shire Stallions, foaled previous to January 1st, 1906.

1st—Independence [5731], bay, stripe, hind feet white, foaled July 4th, 1905. Bred and exhibited by A. G. Gormley, Unionville, Ontario; sire, Fullarton (imp.) [2370] (9910); dam, Madge of Hallcroft (imp.) [4776], by Ornament [3421] (10603).

2nd—Golden Chief [8390], chestnut, ratch, hind legs white, foaled July 2, 1905. Bred by Fred. Hanson, Mitchell, Ontario. Owned and exhibited by P. Herold, V.S., Tavistock, Ontario; sire, Bay Chief [2955] 9979; dam, Jessie Hanson (15587), by Craigiever (imp.) [1330] (6639).

3rd—Golden Conqueror [4251], chestnut, white face and feet, foaled July 27th, 1902. Bred by A. Doherty, Ellesmere, Ontario. Exhibited by Joseph E. Teeson, Thornhill, Ontario; sire, Cloth of Gold [2959] 8962; dam, Daisy Bell [2596], by Bruce (imp.) [1595] (8496).

4th—MacKenzie [4798], bay, stripe, white legs, foaled May 22nd, 1904. Bred and exhibited by Hodgkinson & Tisdale, Beaverton, Ontario; sire, Foremost (imp.) [3364] (11339); dam, Royal Princess [2345], by The Royal Standard (imp.) 2220 (10014).

5th—MacQueen's Champion [5372], bay, star and snip, fore foot and hind leg white, foaled July 7th, 1904. Bred and exhibited by Crawford Bros., Brown's Corners, Ontario; sire, Alexander Macqueen [3291]; dam, Bessie of Upper Springs [4399], by the Granite City (imp.) [709] (5397).

Canadian Bred Clydesdale and Shire Stallions foaled in 1906.

1st—Hedgyn Cornerstone [6451), bay, stripe, nigh forefoot and off hind fetlock white, foaled August 10th, 1906. Bred and exhibited by Chas. Groat, Brooklin, Ont.; sire, Cornerstone (imp.) [3505] (11016); dam, Polly Newday [3026], by Newday (imp.) [1912] (8076).

2nd—Dunrobin Baron [6030], light bay, blaze off fore pastern and hind legs white, foaled May 10th, 1906. Bred and exhibited by Donald Gunn & Son, Beaverton, Ont.; sire, Royal Baron (imp.) [4722] (11161); dam, Jessie Keir 3694, by Lord Lynedoch (imp.) [3004] (4530).

3rd—Sandy Macqueen [6866], bay, face and legs white, foaled July 25th, 1906. Bred and exhibited by John W. Cowie & Son, Markham, Ontario; sire, Alexander Macqueen [3291]; dam, Fanny Redmond [2530], by Brown James (imp.) [731] (5595).

4th—Sandy Montgomery [7700], bay, white face, four white legs, foaled May 21st, 1906. Bred and exhibited by T. A. Wood, Bradford, Ontario; sire, Harmony (imp.) [2951] (10772); dam, Maud Macindoe [5157], by Macindoe (imp.) [538] 7418 (6040).

5th—Souter Jonnie [8016], bay, spot on face, hind legs white, foaled June 18th, 1906. Bred and exhibited by Robert Martin, Wexford, Ontario; sire, Hopewell (imp.) [3377] (11375); dam, Dolly of Aberfoyle [14891], by Plain Boy (imp.) [698] (6141).

6th—Sweet William [6856], foaled in 1906. Exhibited by Alexander Doherty, Ellesmere, Ontario; sire, Right Forward (imp.) [4363] (12310); dam, Sweetheart [5393], by Prince of Blantyre [2239].

7th—Charlie Currah [8200], light bay, face and hind legs white, foaled April 12th, 1906. Owned and exhibited by H. P. Mason, Scarboro', Ontario; sire, Prince of Currah (imp.) [2952] (8916); dam, Rosie Grove [4830], by Janitor (imp.) [2433] (10206).

Canadian Bred Clydesdale and Shire Stallions foaled on or subsequent to January 1st, 1907.

1st—Royal Albane [8366), bay, face and feet white, foaled May 7th, 1907. Exhibited by Thomas Mercer, Markdale, Ontario; sire, Breadalbane (imp.) [4558] (11637); dam, Royal Princess (imp.) [5209], by Royal Carrick [3533] (10270).

2nd—Hurlford [16549], bay, stripe, hind legs white, foaled June 3rd, 1907. Owned and exhibited by Smith & Richardson, Columbus, Ontario; sire, Holstane Chief (imp.) [4254] (12177); dam, Fashion Belle (imp.) [14232], by Locomotion [3975] (11091).

3rd—Baron's Charm [8814], bright bay, stripe, little white on near fore foot, hind legs white, foaled June 16th, 1907. Exhibited by C. B. Gibson, Arthur, Ontario; sire, Baron's Heir (imp.) [5037] (11605); dam, Queenie [4376], by MacClinker (imp.) [2223] (6762).

4th—Gartly's Pride [8813], bay, white face, hind legs and near fore leg white, foaled April 27th, 1907. Bred and exhibited by John Wiggins, Guthrie, Ontario; sire, Baron Gartly [4789] (11601); dam, Biddy [3404], by Toftys Superior [2252].

5th—Baron Chief [6870], brown, star and snip, off fore fetlock and hind legs white, foaled May 12th, 1907. Bred and exhibited by Arch. Coulson, O'Sullivan's Corners, Ontario; sire, Baron Currie (imp.) [7734] (12445); dam, Lady May [12159], by Honour Bound (imp.) [2115] (8700).

6th—Balgray Baron [8824], black face, off fore foot and hind legs white, foaled May 11th, 1907. Owned and exhibited by George Jardine, Bond Head, Ontario; sire, Celtic Baron (imp.) [5415] (12894); dam, Mag Harmony [16534], by Harmony (imp.) [2957] (10772).

7th—Roy Macqueen [8433], bay, star, near fore and hind feet white, foaled April 9th, 1907. Bred and exhibited by J. S. Beare, Cedar Grove, Ontario; sire, Macqueen (imp.) [462] (5200); dam, Brown Polly [10510], by Red Wallie (imp.) [2287] (8183).

Canadian Bred Clydesdale and Shire Mares foaled previous to January 1st, 1906.

1st—Belle Rose [4798], bay, stripe, white ankles, foaled January, 1903. Bred by R. Davies, Toronto, Ontario. Owned and exhibited by the Graham, Renfrew Co., Limited Bedford Park, Ontario; sire, Lyon Macgregor (imp.) [2308] (10376); dam, Princess Belle [2281], by Prince of Quality [2173] (5648).

2nd—Lynedock Queen [5382], light bay, face and hind feet white, foaled April 10th, 1903. Bred by Wm. Wilson, Oshawa, Ontario. Exhibited by The Dominion Transport Company, Toronto, Ontario; sire, Lord Lynedock (imp.) [3004] (4530); dam, Flow [3475], by Macneilage (imp.) [1117] (2992).

3rd—Burndennete Beauty [8573], bay, face, off fore and hind legs white, white spot on belly, foaled May 24th, 1905. Bred and exhibited by A. G. Gormley, Unionville, Ontario; sire, Hopewell (imp.) [3377] (11375); dam, Beauty (imp.) [4784], by Ornament [3421] (10603).

4th—Queenie [4376], bay, stripe, hind feet white, foaled June 6th, 1898. Owned and exhibited by C. A. Towers, River Bank, Ontario; sire, MacClinker (imp.) [2223] (6762).

5th—Jessie of Woodlane [8654], bay, face and hind legs white, foaled May 31st, 1904. Bred by J. J. Marshall, Pine Grove, Ontario. Exhibited by Jas. Neal, Woodbridge, Ontario; sire, Laird of Argo (imp.) 3343 (11776); dam, Maud, 2263, by Macneilage (imp.) [1117] (2992).

Canadian Bred Clydesdale and Shire Mares foaled in 1906.

1st—Barron's Queen [12985], bay, stripe, near fore ankle and hind legs white, foaled May 28th, 1906. Bred by Angus Ross. Beaverton, Ontario. Exhibited by Hodgkinson & Tisdale, Beaverton; sire, Royal Baron (imp.) [4722] (11161); dam, Peeress (imp.) [6658] (Vol. 25, page 42, S.), by Royal Peer [5049] (11175).

2nd—Lady Glenlivet [14333], bay, stripe, four white feet, foaled July 20th, 1906. Bred by Jno. Oke, Courtice, Ontario. Exhibited by Smith & Richardson, Columbus, Ontario; sire, Glenlivet (imp.) [4787] (12165); dam, Fanny Courtice [9969], by Sir Walter (imp.) [1131] (8272).

3rd—Nellie Blythe [11762], brown, stripe, hind legs white, foaled June 23, 1906. Bred and exhibited by Arch. Coulson, O'Sullivan's Corners, Ontario; sire, Baron Currie (imp.) [7734] (12445); dam, Gipsy (bred by A. Coulson), by Pride of Perth (imp.) [282] (2336).

4th—Royal Daisy [12599], light bay, stripe, one hind and one fore leg, and one hind and one fore pastern white, foaled April 30th, 1906. Bred and exhibited by Wm. Wagester, Tavistock, Ontario; sire, Royal Sovereign [5823] (11508); dam, May Queen, by Machardy (imp.) [5655] (8004).

Canadian Bred Clydesdale and Shire Mares, foaled on or subsequent to January 1st, 1907.

1st—May Queen [16416], bay, stripe, four white feet, foaled May 16, 1907. Bred and exhibited by Jno. Graham, Derry West, Ontario; sire, Brogie Stamp (imp.) [4168] (11278); dam, Nancy Hurworth [4173], by Hurworth (imp.) [2490] (5086).

2nd—Lockwood Queen [16418], bay, stripe, under lip white, four white legs, foaled May 26, 1907. Bred and exhibited by Jno. Johnston, Woodbridge, Ontario; sire, Brogie Stamp (imp.) [4168] (11278); dam, Montrave Princess [4385], by Montrave Chief (imp.) [537] (5222).

Shire Stallions, foaled previous to January 1st, 1906.

1st—Newham Duke (imp.) [343] (19893), brown, star in forehead, near hind stocking white, foaled 1899. Bred by F. W. Danger, Newnham Grange, England. Exhibited by J. M. Gardhouse, Weston; sire, Catthorpe Irving (14555); dam, Blossom (27624), by Warwickshire Hero 3rd (15418).

2nd—Royal King 3rd (imp.) [530] (24580), brown, foaled 1904. Bred by R. Moore & Sons, Nottingham, England. Exhibited by John Gardhouse & Sons, Highfield, Ontario; sire, Calwich Legatee (21240); dam, Nottingham Eva (39788), by Menie Andrew (18298).

3rd—Duke of Clarence 10th (imp.) [496] (23257), black brown, white stocking on off hind leg, little white on near hind fetlock, foaled 1902. Bred by H. H. Parry, Glanrafon, Llanerchymedd, Anglesey. Imported and exhibited by Wm. Laking, Haliburton, Ontario; sire, Duke of Clarence 2nd (13001); dam, Gwyndy Queen (48104), by Carbon (3523).

4th—Victor [422], dark bay, face and off hind leg white, foaled 1904. Bred by Morris & Wellington, Fonthill, Ontario. Exhibited by Wm. Laking, Haliburton, Ont.; sire, Coronation 3rd (imp.) [354] (20377); dam, Rose [145], by Pride of Hatfield (imp.) [256] (13103).

Shire Stallions, foaled in 1907.

1st—Solitaire [518], bay, face and three ankles white, foaled May 25th, 1907. Bred and exhibited by Arthur Clarke, Alloa, Ontario; sire, Nateby King 3rd (imp.) [420] (23537); dam, Black Jewel (imp.) [236] (50267), by Tartar 2nd (15385).

Shire Mares, foaled Previous to January 1st, 1906.

1st—Black Jewel (imp.) [236] (50267), black, stripe in face, three white legs, foaled 1902. Bred by Wm. Hall, Westfield, Garstang, England. Exhibited by A. G. Clarke, Alloa, Ontario; sire, Tartar 2nd (15385); dam, Daisy, by Cardinal (2407).

2nd—Bluebell (imp.) [280] (50343), blue roan, star, hind legs white, foaled 1903. Bred by Edward Kirkham, Billsboro, Preston, England. Imported by Morris & Wellington, Fonthill, Ontario. Owned and exhibited by Wm. Laking, Haliburton, Ont.; sire, Horbling Harold (15647); dam, Chestnut mare, by Gunthorpe Advance (13136).

3rd—Lady Luetta [192]. foaled May, 1903, bay, star, hind ankles white. Bred by Morris & Wellington, Fonthill, Ontario. Owned and exhibited by J. M. Gardhouse, Weston, Ontario; sire, Mars (imp.) 275 (17103); dam, Louise [172], by Pride of Hatfield (imp.) [256] (13103).

4th—Holdenby Nicausis (imp.) [276] (Vol. 28 E.), brown, white star, white hairs on nip and nose, both hind socks white, foaled 1904. Bred by John Chambers & Sons, Holdenby, Northampton, England. Exhibited by J. Gardhouse & Sons, Highfield, Ontario; sire, Northgate Prince (15762); dam, Nicausis (imp.) [247] (33270), by Vulcan of Worsley 5th (12601).

5th—Duchess of Holdenby (imp.) [242] (47810), brown, white blaze, fore feet and hind legs white, foaled 1903. Bred by John Chambers & Sons, Holdenby, Northampton, England. Owned and exhibited by Wm. Laking, Haliburton, Ontario; sire, Duke of Anglesey (19555); dam, Cymraes (31548), by Royalist (2448).

Shire Mares, foaled on or Subsequent to January 1st, 1906.

1st—Black Maud [307], black, foaled May 1st, 1906. Bred and exhibited by John Gardhouse & Sons, Highfield, Ontario; sire, Coleshill Royal Albert (imp.) [383] (20367); dam, Black Bess [210], by Darnley (imp.) [183] (3585).

Hackney Stallions 15 hands, 2 inches and over, Foaled Previous to January 1st, 1906.

1st—Colorito (imp.) —333—(8796), chestnut, foaled 1902. Bred by H. G. Stacey, Leeds, England. Imported and exhibited by Graham Bros., Claremont, Ontario; sire, Rosador (4964); dam (11525), Syringa, by Agility (2799).

2nd—Linden Renown (imp.)—331—(8545), bay, near hind foot white, foaled 1901. Bred by Thos. Wing, March, Cambs., England. Exhibited by Hodgkinson & Tisdale, Beaverton, Ontario; sire, Danegelt's Son (6236); dam, (6109) Rosy Pink, by Renown (1887).

3rd—Atwick Astonishment (imp.)—417—(9101), chestnut, face, fore legs and off hind leg white, foaled 1904. Bred by Geo. Mason Gale, Atwick, Seaton, Hull, England. Imported and exhibited by T. H. Hassard, Markham, Ontario; sire, Atwick Jubilee (7689); dam, (4146) Lady Mary of Atwick, by Danegelt (174).

4th—Glenfarg (imp.)—404—(8490), brown, foaled 1901. Bred by Jas. McArthur. Exhibited by Dalgety Bros., London, Ontario; sire, Moncrieffe Statesman (7192); dam, (6834) Lady Agnes, by Pearlfinder.

Hackney Stallions under 15. 2; Foaled Previous to January 1st, 1906.

1st—Copmanthorpe, Swell (imp.)—325—(9535), chestnut, stripe, hoof heads in front white, foaled 1903. Bred by Robt. S. Hall, Langton, Malton, Yorks, England. Imported and exhibited by Graham-Renfrew Co., Bedford Park, Ontario; sire, Garton Duke of Connaught (3009), dam (15945) Lady Hortop, by Pioneer (1088).

2nd—Derwent Performer 8823, foaled 1903, chestnut, star, snip on nose, white near hind fetlock and off fore coronet. Bred by J. Burton & Son, Gallow House, Wath, Helmerby, S. O. Yorks. Exhibited by G. H. Pickering, Brampton, Ontario; sire Rosedaor 4964, dam 13416, Dorothy Derwent.

3rd—Blanche Surprise (imp.)—368—(8745) dark chestnut, white face four white legs, foaled 1903. Bred by John Beal, North Dalton Driffield, England. Imported and exhibited by John A. Boag & Son, Queensville, Ontario; sire, Rosador (4964), dam (15634) Blanche Primrose, by Garton Duke of Connaught (3009).

4th—Flat Top Swell (imp.)—306—(8474), chestnut, 15.1, foaled 1902. Bred by Jno. Braithwaite. Exhibited by T. H. Hassard, Markham, Ontario; sire, Foxholes Swell (7448), dam (7299) Princess May.

5th—Helbeck (imp.)—470—(9268), bay, black points, foaled 1901. Bred by Alex. Morton, Cowanbank, Garvel, Scotland. Imported and exhibited by T. H. Hassard, Markham, Ontario; sire, Ruby [1342], dam, Duchess Derby 3713, by Cadet 1251.

Hackney Stallions, Foaled in 1906.

1st—Langton's Colonel—986—. Exhibited by T. A. Cox, Brantford.

Standard Bred Stallions, Foaled Previous to January 1st, 1906.

1st—Mograzia, 42010, bay, foaled 1903. Bred by O. J. Phelps. Exhibited by Miss K. L. Wilks, Galt, Ontario; sire, Moko, 24457; dam, Congrazia, by Antevolo.

2nd—Arley A., 36329, bay, foaled 1900. Exhibited by Crow & Murray, Toronto; sire, Westbrook, 7501; dam, Jenny McGregor, by McGregor Boy, 2696.

3rd—Grand Allerton, 69437, chestnut. Bred by C. W. Williams, Galesburg, Ill. Owned and exhibited by Hales Bros., Chatham, Ontario; sire, Allerton, 5128; dam, Dawn, by Egmont, 1828.

4th—Imperial, Jr., 1189, 47510 (A.T.R.), brown, foaled March 12, 1905. Exhibited by Fred Garbutt, Toronto Junction; sire, Wilfred Cecil, 34839; dam, Pall Mall, by Gimcrack, 3924.

5th—Bingen Pilot, 40027, bay, foaled 1902. Bred by D. D. Streeter. Exhibited by Miss K. L. Wilks, Galt, Ontario; sire, Bingen, 29567; dam, Kahla Belle, by Pilot Medium, 1597.

6th—Jud Posey, 42479, bay, foaled May 4, 1904. Bred by J. G. Sherman. Exhibited by Tilt & Ross, Derry West, Ontario; sire, Baron Posey, 11725; dam, Honey Sweet, by Virginius, 8146 (A.T.R.)

7th—Good Timber, 35606, foaled 1898. Exhibited by Crow & Murray, Yonge St., Toronto; sire, Big Timber, 29471; dam, Laura P., by Shadeland Onward.

Standard Bred Stallions, Foaled on or Subsequent to January 1st, 1906.

1st—Ormondo, bay, foaled 1906. Bred and exhibited by Miss K. L. Wilks, Galt, Ontario; sire, Oro Wilks; dam, Grismonda.

Standard Bred Mares, Foaled on or Subsequent to January 1st, 1906.

1st—Okom Belle, brown, foaled 1906. Bred and exhibited by Miss K. L. Wilks, Galt, Ontario; sire, Moko, 24457; dam, Congrazia, by Antevolo.

2nd—Vanity Oro, grey. Bred and exhibited by Miss K. L. Wilks, Galt, Ontario; sire, Oro Wilks; dam, Vanity W.

3rd—Woodbine Posey, 73283, bay, foaled 1907. Bred and exhibited by Waldie Steen, Derry West, Ontario; sire, Jud Posey, 42479; dam, Woodbine Fancy, 57480.

Thoroughbred Stallions, Foaled Previous to January 1st, 1906.

1st—Buccleuch (imp.)—134—(Vol. 20, p. 614 E.), brown, foaled 1901. Bred by Lord Polworth, Mertoun House, St. Boswell's, Scotland. Imported and exhibited by T. D. Elliott, Bolton, Ontario; sire, Balsamo; dam, Nightlight, by Knight of the Launol.

2nd—Halfing (imp.) (172), brown, foaled 1892. Exhibited by Paterson Bros., East Toronto, Ontario; sire, Macheath; dam, Moiety, by Charibert.

3rd—St. Basset, 47368, bay, foaled March 26th, 1905. Bred by J. B. Haggin. Exhibited by Jas. Bovaird, Brampton, Ontario; sire, Bassetlam; dam, Berridge, by Artillery (imp.)

4th—Millner, 99 (133), foaled 1892. Exhibited by Crow & Murray, Yonge St., Toronto; sire, St. Simon; dam, Marquesa.

5th—Kapanga Horse, chestnut, aged. Exhibited by Messrs. M. A. & J. G. Barbour, Toronto; sire, Spendthrift (imp.); dam, Kapanga (imp.)

Thoroughbred Stallions, Foaled Previous to January 1st, 1906.

1st—Northern Lights, 57145, bay, foaled 1907. Exhibited by Doane Bros., Yonge St., Toronto; sire, Star Shoot (imp.); dam, Cold Wave.

2nd—Lou Corval, 54277, dark chestnut, foaled April 2, 1907. Owned and exhibited by W. J. Stinson, High Park, Ontario; sire, Cormorant; dam, Lassie Lou, by Head Lad.

Thoroughbred Mares, Foaled on or Subsequent to January 1st, 1906.

1st—Ethelbert, 56155, chestnut, foaled 1907. Exhibited by Crow & Murray, Toronto, Ontario; sire, Ethelbert; dam, Orletta.

2nd Mrs. Siddons, 49001, foaled January 27, 1906. Exhibited by James Bovaird, Brampton, Ontario; sire, David Garrick; dam, Violet S., by Emperor.

Shetland Pony Stallions, Any Age.

1st—Goldfinder—Vol. 15—black. Exhibited by Frank Gillies, Toronto.

Shetland Pony Mares, Any Age.

1st—Tiny Kitt. Exhibited by T. A. Cox, Brantford, Ontario.

Pony Stallions any age, any breed other than Shetland, 14 hands, 1 inch and under.

1st—Plymouth Horace (imp.)—305—(8969) (Hackney), bay, foaled 1903. Bred by Sir Gilbert Greenall, Walton Hall, England. Exhibited by Graham, Renfrew Co., Limited, Bedford Park, Ontario; sire, Sir Horace (5402); dam, (4117) Lady Kate.

2nd—Royal Review (imp.) (10033) (Hackney). Exhibited by T. H. Hassard, Markham, Ontario.

3rd—Bathgate Swell (imp.)—330—(8731), dark brown, foaled 1903. Bred by Fred Jackson, Woodlands, Garstang, England. Imported and exhibited by Graham, Renfrew Co., Limited, Bedford Park, Ontario; sire, Woodlands Eaglet (8339); dam, (14075) Woodlands Buttercup, by Sir Christopher (4504).

Pony Mares, Any Age, Any Breed Other than Shetland, 14 hands, 1 inch and Under.

1st—Berkly Swell, bay, foaled. Exhibited by T. A. Cox, Brantford, Ontario; sire, Berkly Royal, 8375; dam, Berkly Elegance, 1867.

2nd—Ladysmith, chestnut, 6 years old. Exhibited by J. M. Gardhouse, Weston.

3rd—Lorena, dark bay, black points, foaled June, 1905. Exhibited by J. F. Elliott, Oxford Centre, Ontario.

4th—Lady Grey, grey. Exhibited by R. M. Jenkins, Todmorden, Ontario.

Heavy Draught Geldings, or Mares, shown in Single Harness, three years old and over, to be Sired by Either a Registered Clydesdale or Shire Stallion. Registered Name and Number of Sire to be Given with Entry.

1st—Sir George, gelding. Exhibited by Dom. Transport Co., Limited, Toronto; sire, Black Benedict (imp.) [3563] (11275).

2nd—Charlie, bay gelding, three white legs and star in face, foaled 1905. Exhibited by J. W. Cowie & Son, Markham, Ontario; sire, Gallant Chattan (imp.) [4223] (12153).

3rd—Gipsy 7901, bay, face and legs white, foaled June 15, 1904. Exhibited by J. W. Cowie & Son, Markham, Ontario; sire, Ascot, [3942] (10494).

4th—Dougald, gelding, brown. Exhibited by D. A. Murray, Bennington, Ontario; sire, Gartsherrie Blend (imp.) [4096] (10351).

5th—Sir Charles, gelding. Exhibited by Dominion Transport Co., Limited., Toronto; sire, Santiago (imp.) [2472] (10901).

6th—Pride, gelding, dark bay. Exhibited by D. A. Murray, Bennington, Ont.; sire, Huron's Pride [1836].

7th—Bob, bay gelding. Exhibited by Jos. Russell, M.P., Toronto; sire, Granite [1913].

Single Horses, Geldings or Mares, Shown on a Line, Bred in Canada, and the Property of Persons Actually Engaged in Farming or Agricultural Pursuits only, and Owned by the Exhibitor Previous to January 1st, 1909. To be Sired by a Registered Clydesdale or Shire Stallion Registered name and number of Sire to be given with Entry.

1st—Charlie. Exhibited by J. W. Cowie & Son, Markham, Ontario; sire, Gallant Chattan (imp.) [4223] (12153).

2nd—Sandy. Exhibited by J. A. Boag & Son, Queensville, Ontario; sire, Lord Hastings (imp.) (4635).

3rd—Dougald. Exhibited by D. A. Murray, Bennington, Ontario; sire, Gartsherrie Blend (imp.) [4096] (10351).

4th—Pride. Exhibited by D. A. Murray, Bennington, Ontario; sire, Huron's Pride [1836].

5th—Glen Forward. Exhibited by Alex. Doherty, Ellesmere, Ontario; sire, Right Forward [4363] (12310).

6th—Jake Scott. Exhibited by Alex. Doherty, Ellesmere, Ontario; sire, Hopewell [3377] (11375).

Heavy Draught Team, in Harness, Geldings or Mares to be Sired by a Registered Clydesdale or Shire Stallion. Registered Names and Number of Sire to be Given with Entry.

1st—Charlie, bay, gelding; sire, Gallant Cattan (imp.) [4223] (12153) Gipsy, bay; sire, Ascot [3942] (10494). Exhibited by J. W. Cowie & Son, Markham, Ontario.

2nd—Dougald, gelding; sire, Gartsherrie Blend (imp.) [4096] (10351) Pride, gelding; sire, Huron's Pride [1836]. Exhibited by D. A. Murray, Bennington, Ontario.

3rd—Glen Forward, 3 years old; sire, Right Forward [4363] (12310). Jake Scott, 4 years old; sire, Hopewell [3377] (11375). Exhibited by Alex. Doherty, Ellesmere, Ontario.

4th—Bob, bay gelding; sire, Granite [1913] Bill, sire, Prince of Currah [2925] (8916). Exhibited by Joseph Russell, M.P., Toronto.

CHAMPIONSHIPS.

Clydesdale Stallion, Any Age.

1st—Sir Marcus (imp.) [7790] (13205). Exhibited by Graham Bros., Claremont, Ontario.

Clydesdale Mare, Any Age.

1st—Bell Rose [4798], bay foaled January, 1903. Exhibited by The Graham, Renfrew Co., Bedford Park, Ontario.

Canadian Bred Clydesdale or Shire Stallion, Any Age.

1st—Royal Albane [8366), bay, foaled May 7, 1907. Exhibited by Thos. Mercer, Markdale.

Canadian Bred Clydesdale or Shire Mare, Any Age.

1st—Bell Rose [4798], bay, foaled January, 1903. Exhibited by The Graham Renfrew Co., Bedford Park, Ontario.

Shire Stallion, Any Age.

1st—Newnham Duke (imp.) 343 19893, brown, foaled 1899. Exhibited by J. M. Gardhouse, Weston, Ontario.

Shire Mare, Any Age.

1st—Black Jewel (imp.) 236 (50267), black, foaled 1902. Exhibited by A. G. Clark, Alloa, Ontario.

Hackney Stallion, Any Age.

1st—Colorito (imp.)—333—(8796), chestnut, foaled 1902. Exhibited by Graham Bros., Claremont Ontario.

Standard Bred Stallion, Any Age.

1st—Mograzia, 42010, bay, foaled 1903. Exhibited by Miss K. L. Wilks, Galt, Ontario.

Thoroughbred Stallion, Any Age.

1st—Buccleuch (imp.)—134—brown, foaled 1901. Exhibited by T. D. Elliott, Bolton, Ontario.

Pony Stallion, Any Age.

1st—Plymouth Horace (imp.)—305—(8969) (Hackney), bay, foaled 1903. Exhibited by the Graham, Renfrew Co., Limited, Bedford Park, Ontario.

Pony Mare, Any Age.

1st—Berkly Swell, bay. Exhibited by T. A. Cox, Brantford, Ontario.

APPENDIX.

ONTARIO PROVINCIAL WINTER FAIR.

HELD AT GUELPH, DECEMBER 7th to 11th, 1908.

LIST OF PRIZE WINNERS.

CATTLE.

SHORTHORNS.

Steer, 2 years and under 3. Two entries.

1st—John Barr, Blyth. Royal, Oct. 12, 1905. Sire, Silver Plate, 40203; dam, Lady Sylvia, 42084.

2nd—John Brown & Son, Galt. Sept. 15, 1905. Sire, Dunlop, 52405; dam, Red Rose, Vol. XVII.

Steer, 1 year and under 2. Four entries.

1st—John Brown & Sons. White Hero, Dec. 2nd, 1906. Sire, Scottish Hero (Imp) 55042; dam, Matchless of Mapleton 2nd, 53648.

2nd—W. A. Douglas, Tuscarora. White King. Sire, Rosicrucian of Dalmeny, (Imp) 45220 (82117); dam, Clara's Gem, 50339.

3rd—Robt. Talbot, Everton. Crimson Chief, Feb. 7th. Sire, Crimson Ribbon, 40918; dam, Lady Pink, 30935.

4th—John Barr. Blyth Boy, No. 2. Sire, Silver Plate, 40203; dam, Jennet, 37404.

Steer, under 1 year. Six entries.

1st—Donald Gunn & Son, Beaverton. Dunrobin Villager, Sept. 2nd, 1907. Sire, Nonpariel Eclipse, 55704; dam, Village Queen 5th, 64829.

2nd—H. Smith, Exeter. Silver Nugget, Sept. 22nd, 1907. Sire, Gold Drop, 43723; dam, Queen Bess 36th, 70182.

3rd—J. Watt & Son, Salem. White Heather, Sept. 30, 1907. Sire, Heatherman, 59153; dam, Lady English 7th, 17951.

4th—Pĕter Stewart, Everton, Roan Lad, Sept. 7, 1907. Sire, Imperial Beau, 61726; dam, Lady Aberdeen, 58610.

5th—John Currie, Eramosa. Red Prince, Dec. 23, 1907. Sire, Senator Loree, 65506; dam, Aurelia 3rd, 50907.

Cow or Heifer, 3 years or over. Five entries.

1st—Geo. B. Armstrong, Teeswater. Bowhill English Lady 6th, 77420. Jan. 31st, 1905. Sire, Bowhill Banker, 54697; dam, Bowhill English Lady 3rd, 54251.

2nd—J. Watt & Son. English Lady 28th, 67950, Sept. 10th, 1904. Sire, Prince Louis, (Imp) 32082; dam, English Lady 10th, 22935.

3rd—James F. Davidson, Guelph. Red Star, 78567, Nov. 10th, 1905. Sire, Scotland's Fame, (Imp) 50087; dam, Morning Star, 49358.

4th—John Brown & Sons. Princess Atossa 18th, 85253, June 16th, 1904. Sire, Judge, 34626; dam, Princess Atossa 17th, Vol. 18.

5th—J. A. Watt, Elora. Blytheswood Blanche, 57538, Feb. 10th, 1907.

Heifer, 2 years and under 3. Two entries.

1st—Geo. H. Oke, Alvinston. Mildred 16th, 76125, Sept. 26th, 1906. Sire, Scottish Beau, 36099; dam, Mildred 6th, 21067.

2nd—H. Smith. Rosalind's Gem, 80167, March 26th, 1906. Sire, Star Prince, 53900; dam, Bessie Rosalind, 68873.

Heifer, under 2 years. Six entries.

1st—James Leask, Greenbank. Gloster May, 34425, Oct. 1907. Sire, Gloster's Choice, 45238; dam, May Lily, 66978.

2nd—J. Watt & Son. Lady Baroness 3rd, 83075, Jan. 7th, 1907. Sire, Heatherman, 59153; dam, Lady Baroness, 65294.

3rd—J. A. Watt. Secret Rose, 34108, May 1st, 1907.

4th—G. & W. Parkinson, Eramosa. Red Bessie, 80887, Jan. 5th, 1907. Sire, Speedvale Hero, 65551; dam, Bertha's Pet, 52231.

5th—Peter Stewart. Lady Aberdeen 1st, 27604, Nov. 17, 1906. Sire, College Senator, 46048; dam, Lady Aberdeen, 58610.

Best Shorthorn Steer.

1st—D. Gunn & Son, Beaverton.

HEREFORDS AND ABERDEEN-ANGUS.

Steer or Heifer, 1 year and under 2. Three entries.

1st—James Bowman, Guelph. E. P. Beauty 4th, 1852, Sept. 22nd, 1906. Sire, E. P. Raider, 72546; dam, Belle of DeLaval 2nd, 53459.

2nd—James Bowman. E. P. Mayflower 8th, 2128, Oct. 28th, 1906. Sire, E. P. Ranger, 72540; dam, Elm Park Mayflower 3rd, 45948.

3rd—J. W. Burt & Sons, Coningsby. Canada Della, Am. 107868, Sept. 25th, 1906. Sire, Gen. Delarey, 55517; dam, Canada Marion, 84969.

Steer or Heifer, under 1 year. Three entries.

1st—James Bowman. E. P. Matilda, 2878, Sept. 23rd, 1907. Sire, E. P. Ring Leader 3rd, 83332; dam, Century Place Matilda, 64409.

2nd—R. W. McKinnon, Coningsby. Bruno, Jan. 1908. Sire, Canada Leo, Am. 96273; dam, Lady Hamilton of White House, Am. 92230.

3rd—The F. W. Stone Stock Co., Guelph. Diamond, (on file A.H.R.) Jan. 16th, 1908. Sire, Sweet Cider, C.H.R. 2755, A.H.R. 202229; dam, Peach Stone C., C.H.R. 2145, A.H.R. 153840.

Cow or Heifer, 3 years or over. Five entries.

1st—James Bowman. E. P. Pride 3rd, 1650, Dec. 29th, 1903. Sire, Prince of Benton, 58632; dam, Pride of Powrie 11th, 58633.

2nd—Samuel Young, Guelph. Kyma of Tweedhill 2nd, 36460, Feb. 25th, 1899. Sire, Emlyn of Willowgrove, 20984; dam, Lady Kyma, 17607.

3rd—Walter Hall, Washington. Pride of Maple Bank, 74027, Nov. 4th, 1903. Sire, Klondyke of the Burn, 58546; dam, Pride of Aberdeen, 62927.

4th—F. W. Stone Stock Co. Beach Bar, C.H.R. 4804, A. H.R. 219620, Dec. 13th, 1904. Sire, Baronet, A.H.R. 100989, C.H.R. 1292; dam, Peach 35th, A.H.R. 101444, C.H.R. 3039.

5th—Samuel Young. Springside May, 96974, Oct. 28th, 1904. Sire, Proctor's B. Prince, 34504; dam, Kyma of Tweedhill, 36460.

GALLOWAYS AND DEVONS.

Steer or Heifer, 2 years and under 3. One entry.

1st—D. MacCrae, Guelph. Caadoo, 1667, July 14th, 1906. Sire, Victory, 1304; dam. Cornelia, 1316.

Steer or Heifer, 1 year and under 2. Two entries.

1st—D. MacCrae. Kally, 1657, Oct. 26th, 1906. Sire, Royal Ensign, 1305; dam, Celinda, 1368.

2nd—D. MacCrae. Jane Seaton 9th, 1653, Dec. 30th, 1906. Sire, Royal Ensign, 1305; dam, Beauty 2nd, 1336.

Steer or Heifer under 1 year. Two entries.

1st—D. MacCrae. Cecilia, 1778, Oct. 13th, 1907. Cedric 4th, 1303; dam, Celinda, 1368.

2nd—D. MacCrae. Semiramus 42nd, 1782, Jan. 20th, 1908. Sire, Victory, 1304; dam, Semiramus 36th, 1345.

Cow or Heifer, 3 years and over. Two entries.

1st—D. MacCrae. Miss Mary A. 1409, Jan. 10th, 1905. Sire, Cedric 4th, 1303; dam, Duchess 15th, 14853.

Grades or Crosses.

Steer, 2 years and under 3. Six entries.

1st—James Leask. White King, Oct. 9th, 1905. Sire, Gloster's Choice, 45238.

2nd—John Brown & Son. Rambler, Oct. 1905. Sire, Merry Star, 53069.

3rd—Alex. Edmondson, Brantford. Duke of Brant, Sept. 26th, 1905. Sire, Duke of Brant, 52031.

4th—John Keith, Salem. Salem Lad, Aug. 7th, 1906. Sire, Royal Star, 49775.

5th—Arthur Barr. Blyth. Bob., Jan. 1906. Sire, Silver Plate, 40203.

Steer, 1 year and under 2. Ten entries.

1st—John Lowe, Elora. Black Hector, Sept. 10th, 1906. Sire, Elm Park Ringleader, 72541.

2nd—James Leask. Red King, Sept. 5th, 1906. Sire, Gloster's Choice, 45238.

3rd—Kyle Bros. Ayr. Chancellor's Stamp, Sept. 17th. Sire, Bapton Chancellor, (Imp) 40359.

4th—John H. Kirby, Marden. John, Mar. 25th, 1907. Sire, Wanderer's Star, 48585.

5th—John Currie, Eramosa. White Socks, Aug. 1907. Sire, Royal Wonder 2nd, 49776.

Steer under 1 year. Fourteen entries.

1st—Kyle Bros. Chancellor's Seal, Sept. 4th. Sire, Bapton Chancellor, (Imp) 40359.

2nd—James McIntosh, Gourock. Harrigan, Sept. 11th, 1907. Sire, Bellman, 59616.

3rd—James Leask. Roan King, Oct. 12th, 1907. Sire, Gloster's Choice, 45238.

4th—H. E. Alton, Jr., Everton, White Lad, Sept. 20th, 1907. Sire, Imperial Beau, 61726.

5th—John P. Henderson, Guelph. Sandy, Nov. 22nd. Sire, Elm Park King 2nd, 72542.

Cow or Heifer, 3 years or over. Six entries.

1st—John Brown & Sons. Ethel.

2nd—James Leask. Lady Watson, Mar. 19th, 1905.

3rd—John Barr. Mabel, Apr., 1905.

4th—Jeremiah Wright, Marden. May 10th, 1904.

5th—John Barr. July, 1905.

Heifer, 2 years and under 3. Six entries.

1st—G. & W. Parkinson. Irene, April 10th, 1906. Sire, Royal Wonder, 2nd, 49776.

2nd—John Keith. Rose Devena, July 21st, 1906. Sire, Royal Star, 49775.

3rd—J. M. Taylor, Guelph Sept. 1906.

4th—Henry W. Ironside, Puslinch. Maggie Schaw, April, 1906. Sire, Jealous Hero, 55589.

5th—E. Brien & Son, Ridgetown. Flora, Dec. 18th, 1905. Sire, Early Morning, 58701.

Heifer under 2 years. Six entries.

1st—Peter Stewart. Lily, Jan. 3rd, 1907. Sire, College Senator, 46048; dam, Whity.
2nd—Robt. Talbot. College Lady, Dec. 20th. Sire, College Senator, 46048; dam, Lady Pink.
3rd—James Leask. Hookey 2nd, Oct. 5th, 1907.
4th—J. M. Taylor. Sept. 1906.
5th—J. W. Burt & Sons. Susie, Oct. 10th, 1906. Sire, Gen. Delarey, 55517.

Three Export Steers. One entry.

1st—John Brown & Sons, Galt.

Grand Championship, Best Beef Animal.

1st—John Lowe, Elora.

DRESSED CARCASSES.

Pure-Breds. Six entries.

1st—The F. W. Stone Stock Company.
2nd—D. MacCrae.
3rd—James Bowman.
4th—H. Smith.
5th—Geo. H. Oke.

Grades or Crosses. Nine entries.

1st—John Brown & Sons.
2nd—John P. Henderson.
3rd—Dan. Wright, Ponsonby.
4th—Chas. McDougall, Guelph.
5th—T. Baker & Son, Solina.

Best Export Steer. Special.

1st—John Brown & Sons.

Grade Steer or Heifer, any age, sired by a pure-bred Aberdeen-Angus Bull. Special.

1st—John Low. 2nd—John Brown & Son. 3rd—John P. Henderson.

Grade Steer, sired by a pure-bred Shorthorn Bull, Special.

1st—James Leask. Sire, Gloster's Choice, 45238.
2nd—Kyle Bros. Sire, Bapton Chancellor, (Imp) 40359.
3rd—James McIntosh. Sire, Bellman, 59616.

Grade Steer, sired by a pure-bred Shorthorn Bull, Amateur Special.

1st—James McIntosh. Sire, Bellman, 59616.
2nd—H. E. Alton, Jr. Sire, Imperial Beau, 61726.
3rd—Geo. Holmwood. Sire, Rose Victor, 64835.
4th—John H. Kirby. Sire, Wanderer's Star, 48585.
5th—John Currie. Sire, Royal Wonder 2nd, 49776.

Grade Steer or Heifer, fed in the County of Wellington, and owned by Exhibitor at least three months previous to the Show, Special.

1st—John Lowe.

Galloway Steer or Heifer, 2 years or over. Special.

1st—D. MacCrae. 2nd—D. MacCrae.

Galloway Steer or Heifer, under 2 years, Special.

1st.—D. MacCrae. 2nd—D. MacCrae.

Grade or Cross, Steer, 2 years and under 3. Amateur Special.

1st—John Keith. 2nd—Alex. Edmondson. 3rd—Arthur Barr.

Grade or Cross, Steer, 1 year and under 2. Amateur Special.

1st—John H. Kirby.
2nd—John Currie.
3rd—C. W. Gerow.
4th—T. Baker & Son.

Grade or Cross, Steer under 1 year. Amateur Special.

1st—James McIntosh.
2nd—H. E. Alton, Jr.
3rd—J. P. Henderson.
4th—Geo. Holmwood.

Grade or Cross, Heifer 2 years and under 3. Amateur Special.

1st—John Keith. 2nd—J. M. Taylor. 3rd—H. W. Ironside.

Grade or Cross, Heifer under 2 years. Amateur Special.

1st—Robt. Talbot. 2nd—J. M. Taylor. 3rd—J. W. Burt & Son

SHEEP.

COTSWOLDS.

Ewe, under 1 year. Nine entries.

1st—E. Brien & Son, Ridgetown. Brien's 233, 50287, Mar. 1908. Sire, Barret's 11, 36674; dam, Brien's 52, 30228.

2nd—Hugh McNelly, Guelph. Park Ewe, 478, 49644, Mar. 25, 1908. Sire, Swanwick's 131, 44328; dam, Park Ewe 278, 37533.

3rd—E. Brien & Son. Brien's 238, 50360, Mar. 1908. Sire, Barret's 11, 36674; dam, Brien's 149, 43355.

4th—John Sockett, Rockwood. Sockett's 311, 50405, Spring, 1908. Sire, Garner's 70, 24811; dam, Sockett's 119, 35707.

5th—E. Brien & Son. Brien's 239, 50361, Mar. 1908. Sire, Barrett's 11, 36674; dam, Brien's 107, 40352.

3 Ewes, under 1 year. Four entries.

1st.—E. Brien & Son.
2nd—John Sockett.
3rd—Hugh McNelly.

Wether, 1 year and under 2. Six entries.

1st—E. Brien & Son. Brien's B, March, 1907. Sire, Corncracker, 30006; dam, Brien's 88, 33585.

2nd—E. Brien & Son. Brien's A, March, 1907. Sire, Corncracker, 30006; dam, Brien's 88, 33585.

3rd—E. Brien & Son. Brien's C, March, 1907. Sire, Corncracker, 30006; dam, Brien's 53, 30229.

4th—John Sockett. Sockett's 202. Spring, 1907. Sire, Slater's 198, 36098; dam, Sockett's 108, 30830.

5th—Hugh McNelly. April, 1907. Sire, Vance's 38, 25334; dam, Goodfellow's 40, 38283.

Wether, under 1 year. Seven entries.

1st—E. Brien & Son. Brien's F, March, 1908. Sire, Barrett's 11, 36674; dam, Law's 69, 32067.

2nd—E. Brien & Son. Brien's G, March, 1908. Sire, Barrett's 11, 36674; dam, Brien's 16, 22258.

3rd—E. Brien & Son. Brien's E, March, 1908. Sire, Barrett's 11, 36674; dam, Law's 69, 32067.

4th—E. Brien & Son. Brien's D, March, 1908. Sire, Barrett's 11, 36674; dam, Brien's 88, 33585.

5th—John Sockett. Sockett's 67, Spring, 1908. Sire, Garner's 70, 24811; dam, Sockett's 143, 31685.

3 Wethers, under 1 year. Three entries.

1st—E. Brien & Son.
2nd—John Sockett.
3rd—E. Brien & Son.

Best Wether, under 2 years.

1st—E. Brien & Son.

Cotswold Dressed Carcasses.

Wether, 1 year and under 2. Six entries.

1st—E. Brien & Son.
2nd—Hugh McNelly.
3rd—John Sockett.
4th—E. Brien & Son.
5th—E. Brien & Son.

Wether, under 1 year. Four entries.

1st—John Sockett.
2nd—E. Brien & Son
3rd—E. Brien & Son.
4th—E. Brien & Son.

LINCOLNS.

Ewe under 1 year. Ten entries.

1st—John T. Gosnell & Sons, Highgate. Fanny Dudding, 18870, Spring 1908. Sire, Dudding's (Imp.) 265; dam, Gosnell's No. 5, 15274.

2nd—J. T. Gibson, Denfield. Gibson's 455, 18891, Spring, 1908. Sire, Dudding's 512, 16104; dam, Dowsley Queen, 17735.

3rd—John T. Gosnell & Sons. Dudding's Gem, 18872, Spring, 1908. Sire, Dudding's (Imp), 265; dam, Gosnell's No. 3, 13941.

4th—John T. Gosnell & Sons. Dudding's Queen, 18869, Spring, 1908. Sire, Dudding's (Imp.), 265; dam, Gosnell's No. 11, 15280.

5th—J. T. Gibson. Gibson's 464, 18900, Spring, 1908. Sire, Dudding's 512, 16104; dam, Dowsley Gem, 17734.

3 Ewes under 1 year. Four entries.

1st—John T. Gosnell & Sons.
2nd—J. T. Gibson.
3rd—L. Parkinson, Eramosa.
4th—Ernest Parkinson, Eramosa.

Wether, 1 year and under 2. Four entries.

1st—L. Parkinson. Parkinson's 737, Spring, 1907. Sire, Bryon's 9474; dam, Parkinson's 466, 13680.

2nd—L. Parkinson. Parkinson's 738, Spring, 1907. Sire, Bryon's 9474; dam, Parkinson's 469, 13683.

3rd—L. Parkinson. Parkinson's 720, Spring, 1907. Sire, Bryon's 9474; dam, Parkinson's 468, 13682.

4th—L. Parkinson. Parkinson's 721, Spring, 1907. Sire, Bryon's 9474; dam, Parkinson's 464, 13678.

Wether, under 1 year. Seven entries.

1st—John T. Gosnell & Sons. Spring, 1908. Sire, Dudding's 265, 11154; dam, Gould's No. 32, 17376.

2nd—L. Parkinson. Parkinson's 740, Spring, 1908. Sire, Bryon's 9474; dam, Parkinson's 471, 13685.

3rd—J. T. Gibson Spring, 1908. Sire, Dudding's 512, 16104; dam, Gibson's 330, 13923.

4th—J. T. Gibson. Spring, 1908. Sire, Dudding's 512, 16104; dam, Gibson's 225, 11944.

5th—L. Parkinson. Dick, Spring, 1908. Sire, Lord Lincoln, 10386; dam, R. S. R.'s A3, 15446.

3 Wethers, under 1 year. Three entries.

1st—L. Parkinson. 2nd—J. T. Gibson. 3rd—L. Parkinson.

Best Wether, under 2 years.

1st—L. Parkinson.

LINCOLN DRESSED CARCASSES.

Wether, 1 year and under 2. Three entries.

1st—L. Parkinson. 2nd—L. Parkinson. 3rd—L. Parkinson.

Wether, under 1 year. Three entries.

1st—L. Parkinson. 2nd—L. Parkinson. 3rd—J. T. Gibson.

LEICESTERS.

Ewe, under 1 year. Twelve entries.

1st—Hastings Bros., Crosshill. Kelly's 720, 11736, March, 1908. Sire, Kelly's Choice, 9708; dam, Kelly's 503, 9354.

2nd—John Kelly, Shakespeare. Kelly's 718, 11735, March, 1908. Sire, Kelly's Choice, 9708; dam, Kelly's Lena, 6676.

3rd—John Kelly. Kelly's 717, 11734, March, 1908. Sire, Kelly's Choice, 9708; dam, Kelly's Lena, 6676.

4th—James Roy, Bornholm. Royal Beatrice 2nd, 11988, March, 1908. Sire, M. L. Wallace, 99, 10413; dam, Royal Beatrice, 7320.

5th—James Roy, Gracie 7th, 11987, March, 1908. Sire, M. L. Wallace, 99, 10413; dam, Miss Delmarch, 9206.

3 Ewes, under 1 year. Six entries.

1st—John Kelly.
2nd—James Roy.
3rd—Hastings Bros.
4th—John Barber, Salem.
5th—Oliver Turnbull, Walton.

Wether, 1 year and under 2. Six entries.

1st—Hastings Bros., Belmont Laddie, 11287, April, 1907. Sire, Sam, 7924; dam, Pauline, 6628.

2nd—A. & W. Whitelaw, Guelph. Peter W. March, 1907. Sire, Ulysses, (Imp.), 10085; dam, Jenny Berry, 2754.

3rd—A. & W. Whitelaw. Bob Remus, April, 1907. Sire, Billy Remus, 9566; dam, Daisy of Guelph 4th, 5413.

4th—John Barr, Blyth. Royal, April, 1907. Sire, Blyth Boy, 9384; dam, Corning's No. 3, 10504.

5th—Hastings Bros. Creole, 11278, April, 1907. Sire, Sam, 7924; dam, Fanny Purchase, 4175.

Wether, under 1 year. Thirteen entries.

1st—John Kelly. March, 1908. Sire, Kelly's Choice, 9708; dam, Kelly's Pride, 4905.

2nd—James Roy. Better Sight, March, 1908. Sire, M. L. Wallace, 99, 10413; dam, Gracie 3rd, 9207.

3rd—A. & W. Whitelaw. Jack W., April, 1908. Sire, Mat. Templeton, 11116; dam, Mary Annison 3rd, 3145.

4th—Oliver Turnbull. Meadow W., 3, March, 1908. Sire, Turnbull's No. 22, 7872· dam, Turnbull's No. 3, 6468.

5th—James Roy. Wallace M., March, 1908. Sire, M. L. Wallace, 99, 10413; dam, Pearlette M. L. 2nd, 9202.

3 Wethers, under 1 year. Four entries.

1st—James Roy.
2nd—A. & W. Whitelaw.
3rd—Oliver Turnbull.
4th—Hastings Bros.

Best Wether, under 2 years.

1st—Hasting Bros.

LEICESTER DRESSED CARCASSES.

Wether, 1 year and under 2. Five entries.

1st—Hastings Bros. 2nd—John Barr. 3rd—A. & W. Whitelaw.

Wether, under 1 year. Four entries.

1st—A. & W. Whitelaw, 2nd—Oliver Turnbull. 3rd—Hastings Bros.

OXFORDS.

Ewes, under 1 year. Fourteen entries.

1st—Alex. Stewart, Living Springs. Stewart's 100, 47130, March, 1908. Sire Hamptonian, 126, 41339; dam, Stewart's 48, 31435.

2nd—Alex. Stewart. Stewart's 102, 47132, March, 1908. Sire, Hamptonian, 126, 41339; dam, Stewart's 69, 37935.

3rd—J. W. Lee & Sons, Simcoe. Lee's Ewe No. 3, 46778, March, 1908. Sire, Hamptonian, 132, 46243; dam, Helbon Queen 2nd, 25685.

4th—J. W. Lee & Sons. Lee's Ewe No. 4, 46780, March, 1908. Sire, Hamptonian, 132, 46243; dam, Lee's Ewe, 102, 35200.

5th—Alex. Stewart. Stewart's 101, 47131, March, 1908. Sire, Hamptonian, 136, 41339; dam, Stewart's 78, 41498.

3 Ewes, under 1 year. Five entries.

1st—Alex. Stewart.
2nd—J. W. Lee & Sons.
3rd—J. A. Cerswell, Bond Head.
4th—A. Stevenson, Atwood.

Wether, 1 year and under 2. Seven entries.

1st—J. W. Lee & Sons. Helbon King, 139, 42274, March, 1907. Sire, Kelmscotonian, 52, 30521.

2nd—W. E. Wright, Glanworth. Wright's 618, 47109, March, 1907.

3rd—J. W. Lee & Sons. Helbon King, 144, 42279, March, 1907. Sire, Kelmscotonian, 52, 30521.

4th—J. A. Cerswell. Cerswell's, 77, 46211, April, 1907. Sire, Sunset, 38348; dam, Arkell's, 1965, 37976.

5th—A. Stevenson. Stevenson's, 82, 43321, March, 1907, Sire, Stewart's 75, 41495; dam, Cousin's 160, 25613.

Wether, under 1 year. Thirteen entries.

1st—J. W. Lee & Sons. Lee's Wether, 74, 47225, March, 1908. Sire, Kelmscotonian, 52, 30521; dam, Lee's Ewe, 98, 34087.

2nd—J. W. Lee & Sons. Lee's Wether, 75, 47226, March, 1908. Sire, Kelmscotonian, 52, 30521; dam, Lee's Ewe, 98, 34087.

3rd—W. E. Wright. Wright's, 625, 47111, March, 1908.

4th—J. A. Cerswell. Cerswell's, 103, 47135, April, 1908. Sire, Sunset, 38348; dam, Cerswell's, 39, 42644.

5th—J. A. Cerswell. Cerswell's, 101, 47133, April, 1908. Sire, Sunset, 38348; dam, Cerswell's, 56, 39752.

3 Wethers, under 1 year. Four entries.

1st—J. W. Lee & Sons.
2nd—J. A. Cerswell.
3rd—W. E. Wright.
4th—A. Stevenson.

Best Wether under 1 year.

1st—J. W. Lee & Sons.

OXFORD DRESSED CARCASSES.

Wether, 1 year and under 2. Seven entries.

1st—J. A. Cerswell.
2nd—A. Stevenson.
3rd—A. Stevenson.
4th—W. E. Wright.
5th—J. W. Lee & Sons.

Wether, under 1 year. Eight entries.

1st—J. W. Lee & Sons.
2nd—J. A. Cerswell.
3rd—A. Stevenson.
4th—W. E. Wright.
5th—W. E. Wright.

SHROPSHIRES.

Ewe, under 1 year. Six entries.

1st—J. & D. J. Campbell, Woodville. Campbell's, 1620, 278202, Spring, 1908.
2nd—J. & D. J. Campbell. Campbell's, 1626, 278204, Spring, 1908.
3rd—J. & D. J. Campbell. Campbell's, 1629, 278205, Spring, 1908.
4th—J. & D. J. Campbell. Campbell's, 1634, 278206, Spring, 1908.
5th—H. & J. Kellum, Simcoe. 285006, March, 1908. Sire, Dream, 204497; dam, Juke's, 43-3, 20453.

3 Ewes, under 1 year. Two entries.

1st—J. & D. J. Campbell.
2nd—Abram Rudell, Hespeler.

Wether, 1 year and under 2. Eight entries.

1st—J. W. Lee & Sons. Campbell's, 29. 282912, April, 1907. Sire, Marauder, 3, 219290; dam, Campbell's 204, 219800.
2nd—W. E. Wright. Wright's, 631, 264783, 1907.
3rd—J. W. Lee & Sons. Campbell's, 30, 282913, April, 1907. Sire, Marauder, 3, 219290; dam, Campbell's, 204, 219800.
4th—W. E. Wright. Wright's, 638, 264784, 1907.
5th—J. & D. J. Campbell. Campbell's, 1563, 260199, Spring, 1907.

Wether, under 1 year. Ten entries.

1st—J. & D. J. Campbell. Campbell's, 1642, 282679, 1908.
2nd—J. & D. J. Campbell. Campbell's, 1654, 282680, 1908.
3rd—J. & D. J. Campbell. Campbell's, 1689, 282683, 1908.
4th—W. E. Wright. Wright's, 608, 283465, 1908.
5th—W. E. Wright. Wright's, 611, 283466, 1908.

3 Wethers, under 1 year. Four entries.

1st—J. & D. J. Campbell.
2nd—J. & D. J. Campbell.
3rd—W. E. Wright.
4th—Abram Rudell.

Best Wether, under 2 years.

1st—J. W. Lee & Sons.

SHROPSHIRE DRESSED CARCASSES.

Wether, 1 year and under 2. Six entries.

1st—W. E. Wright.
2nd—J. W. Lee & Sons.
3rd—Abram Rudell.
4th—W. E. Wright.
5th—J. W. Lee & Sons.

Wether, under 1 year. Six entries.

1st—W. E. Wright.
2nd—Abram Rudell.
3rd—J. & D. J. Campbell.
4th—Abram Rudell.
5th—Abram Rudell.

SOUTHDOWNS.

Ewe, under 1 year. Nine entries.

1st—Telfer Bros., Paris. Simenton, 314, 23464, Spring, 1908. Sire, Jackson, 23, 21600: dam, Simenton Ewe, 215, 17388.

2nd—Geo. Baker, Simcoe. Baker's Ewe, 187, 23346, February 5th, 1908.

3rd—Geo. Baker. Baker's Ewe, 190, 23349, March 3rd, 1908.

4th—Robert McEwen, Byron. McEwen, 4-A, 23405, March, 1908. Sire, Stetchworth Conqueror, 18601; dam, McEwen, 103, 17209.

5th—Geo. Baker. Baker's Ewe, 191, 23763, March 14th, 1908.

3 Ewes, under 1 year. Four entries.

1st—Geo. Baker. 2nd—Geo. Baker. 3rd—Telfer Bros.

Wether, 1 year and under 2. Four entries.

1st—Robert McEwen. McEwen, 234, 22349, March, 1907. Sire, Balnaham Hodge, 17471; dam, Bathurst, 240, 20865.

2nd—Geo. Baker. Baker Wether, 1, 23334.

3rd—Geo. Baker. Baker Wether, 23, 22471.

4th—Robt. McEwen. McEwen 267, March, 1907. Sire, Balnaham Glory, 19655; dam, McEwen, 115, 14081.

Wether, under 1 year. Six entries.

1st—J. W. Lee & Sons. May, 1908. Sire, St. Albon, 17474; dam, Ewe, Ass'n. No. 15966.

2nd—Robt. McEwen. McEwen, 15A, 23758, March, 1908. Sire, Stetchworth Conqueror, 18601; dam, McEwen, 143, 17213.

3rd—Robt. McEwen. McEwen, 38A, 23757, March, 1908. Sire, Stetchworth Conqueror, 18601; dam, McEwen, 94, 13418.

4th—Telfer Bros., Telfer's Wether, 30, Spring, 1908. Sire, Oakley 1st, 21108; dam, Telfer Ewe, 124, 16828.

5th—Telfer Bros. Telfer's Wether, 31, Spring, 1908. Sire, Oakley 1st, 21108; dam, Telfer Ewe, 151, 19866.

3 Wethers, under 1 year. Two entries.

1st—Robt. McEwen. 2nd—Telfer Bros.

Best Wether, under 2 years.

1st—Robt. McEwen.

SOUTHDOWNS, DRESSED CARCASSES.

Wether, 1 year and under 2. Four entries.

1st—Geo. Baker. 2nd—Robt. McEwen. 3rd—Robt. McEwen.

Wether, under 1 year. Three entries.

1st—J. W. Lee & Sons. 2nd—Telfer Bros. 3rd—Robt. McEwen.

DORSET HORNS.

Ewe, under 1 year. Three entries.

1st—R. H. Harding, Thorndale. Harding's, 77, 7749, November, 1907. Sire, Hambro's best Ram Lamb, 3836; dam, Harding's, 38C, 5460.

2nd—R. H. Harding. Harding's 78, 7750, January, 1908. Sire, Hambro's best Ram Lamb, 3836; dam, Dyment's, 36, 4878.

3rd—R. H. Harding. Harding's, 83, 7755, February, 1908. Sire, Hambro's best Ram Lamb, 3836; dam, MacGillivray's, 1006, 4743.

Wether, 1 year and under 2. Four entries.

1st—W. E. Wright. Riverview, 90, 8152, 1907.

2nd—R. H. Harding. Harding's, 69, 6673, February, 1907. Sire, Tranquility, 4530; dam, My Honey, 5636.

3rd—R. H. Harding. Jack, 7148, April, 1907. Sire, Randolph, 5963; dam, Dyment's, 59, 6114.

4th—R. H, Harding. Dixon's best, 7172, May, 1907. Sire, Dixon, 4239; dam, Dyment's, 30, 6115.

Wether, under 1 year. Five entries.

1st—R. H. Harding. Billy Brock, 8171, January, 1908. Sire, Hunter's, 37, 2858; dam, McGillivray's, 5, 3825.

2nd—W. E. Wright. Riverview, 93, 8155, 1908.

3rd—W. E. Wright. Riverview, 94, 8156, 1908.

4th—R. H. Harding. The Hero, 8172, February, 1908. Sire, Hambro's best, 3836; dam, Nettie's Weaver, 2, 7030.

3 Wethers, under 1 year. Two entries.

1st—R. H. Harding. 2nd—W. E. Wright.

Best Wether, under 2 years.

1st—W. E. Wright.

DORSET HORN DRESSED CARCASSES.

Wether, 1 year and under 2. Four entries.

1st—R. H. Harding. 3rd—R. H. Harding.
2nd—R. H. Harding. 4th—W. E. Wright.

Wether, under 1 year. Five entries.

1st—W. E. Wright. 2nd—R. H. Harding. 3rd—R. H. Harding.

HAMPSHIRES OR SUFFOLKS.

Ewe, under 1 year. Four entries.

1st—John Kelly. Kelly's, 57, 16975, March, 1908. Sire, Kelly's Sailor, 6764; dam, Cochran's, 349, 10401.

2nd—Telfer Bros. Telfer's Ewe, 73, 17413, Spring, 1908. Sire, 6754; dam, 11969.

3rd—John Kelly. Kelly's, 53, 16971, March, 1908. Sire, Kelly's Sailor, 6764; dam, Jennie, 8208.

4th—Telfer Bros. Telfer's Ewe, 74, 17414, Spring, 1908. Sire, 6754; dam, 12189.

Wether, under 1 year. Four entries.

1st—John Kelly. Ben, March, 1908. Sire, Kelly's Sailor, 6764; dam, Bonnie Pride, 10611.

2nd—John Kelly. Bob, March, 1908. Sire, Kelly's Sailor, 6764; dam, Bonnie Lass, 10613.

3rd—John Kelly, Bill, March, 1908. Sire, Kelly's Sailor, 6764; dam, Jennie, 8208.

3 Wethers, under 1 year. One entry.

1st—John Kelly.

Best Wether, under 2 years.

1st—John Kelly.

HAMPSHIRE OR SUFFOLK DRESSED CARCASSES.

Wether, under 1 year. Two entries.

1st—John Kelly.

GRADES OR CROSSES, SIRED BY A RAM OF A LONG-WOOLED BREED.

Wether, 1 year and under 2. Nine entries.

1st—E. Brien & Son. Brien's K., March, 1907. Sire, Corncracker, 30006.
2nd—Telfer Bros. Telfer's Favorite, March, 1907. Sire, Clarkson, 14697.
3rd—L. Parkinson. Ike, Spring, 1907. Sire, White's, 26, 13686.
4th—L. Parkinson. Jim, Spring, 1907. Sire, White's, 26, 13686.
5th—L. Parkinson. Mike, Spring, 1907. Sire, White's 26, 13686.

Wether, under 1 year. Seven entries.

1st—E. Brien & Son. Brien's N., March, 1908. Sire, Barrett's 11, 36674.
2nd—A. & W. Whitelaw. Sire, Ulysses, 10085.
3rd—Oliver Turnbull. Meadow W., 5. Sire, Turnbull's No. 22, 7872.
4th—E. Brien & Son. Brien's M., March, 1908. Sire, Barrett's 11, 36674.
5th—L. Parkinson. Parkinson's. 750, Spring, 1908. Sire, Mitchell's, 150, 13435.

3 Wethers, under 1 year. Three entries.

1st—E. Brien & Son. 2nd—A. & W. Whitelaw. 3rd—L. Parkinson.

Best Wether, under 2 years.

1st—E. Brien & Son.

LONG-WOOLED GRADE OR CROSS, DRESSED CARCASSES.

Wether, 1 year and under 2. Six entries.

1st—E. Brien & Son.
2nd—Hastings Bros.
3rd—John Barr.
4th—E. Brien & Son.
5th—L. Parkinson.

Wether, under 1 year. Five entries.

1st—Oliver Turnbull.
2nd—E. Brien & Son.
3rd—L. Parkinson.
4th—A. & W. Whitelaw.
5th—L. Parkinson.

GRADE OR CROSS, SIRED BY A RAM OF A SHORT-WOOLED BREED.

Wether, 1 year and under 2. Six entries.

1st—J. & D. J. Campbell. No. 1, 1907. Sire, Boles', 295, 220252.
2nd—J. & D. J. Campbell. 'No. 2, 1907. Sire, Boles' 295, 220252.
3rd—J. & D. J. Campbell. No. 3, 1907. Sire, Boles' 295, 220252.
4th—W. E. Wright. Jack, 1907. Sire, The Gentleman, 110866.

Wether, under 1 year. Fifteen entries.

1st—J. & D. J. Campbell. No. 4, Spring, 1908. Sire,, Boles', 295, 220252.
2nd—J. & D. J. Campbell. No. 5, Spring, 1908. Sire. Boles', 295, 220252.
3rd—J. W. Lee & Sons. Sire, Helbon King, 7, 42813.
4th—John Kelly. Joe, 1908. Sire, Kelly's, 30, 5969.
5th—J. & D. J. Campbell. No. 6, Spring, 1908. Sire, Boles', 295, 220252.

3 Wethers. under 1 year. Five entries.

1st—John Kelly.
2nd—J. & D. J. Campbell.
3rd—J. & D. J. Campbell.
4th—W. E. Wright.

Best Wether, under 2 years.

1st—J. & D. J. Campbell.

SHORT-WOOLED GRADE OR CROSS. DRESSED CARCASSES.

Wether, 1 year and under 2. Three entries.

1st—A. Stevenson. 2nd—J. & D. J. Campbell. 3rd—W. E. Wright.

Wether, under 1 year. Ten entries.

1st—J. A. Cerswell.
2nd—J. & D. J. Campbell.
3rd—Abram Rudell.
4th—Abram Rudell.
5th—W. E. Wright.

Best Pure-Bred Wether Lamb, of a Long-Wooled Breed. Special for Amateurs.

1st—James Roy, Bornholm.

Best Pure-Bred Wether Lamb, of a Short-Wooled Breel. Special for Amateurs.

1st—Alex. Stewart, Living Springs.

Pen of Five Lambs, any Breed, Grade or Cross. Special.

1st—J. & D. J. Campbell, Woodville.

Fat Sheep, Bred and Owned by Resident of Wellington County. Special.

1st—A. & W. Whitelaw, Guelph.
2nd— L. Parkinson, Eramosa.
3rd—John Barker, Salem.

Pen of Three Leicester Ewe Lambs. Special.

1st—James Roy, Bornholm.
2nd—James Grill, Elora.

OXFORD DOWN SPECIAL PRIZES.

Yearling Wether.

1st—W. E. Wright. Glanworth.
2nd—J. A. Cerswell, Bond Head.
3rd—A. Stevenson, Atwood.

Lamb Wether.

1st—J. W. Lee & Sons, Simcoe.
2nd—J. W. Lee & Sons.
3rd—W. E. Wright, Glanworth.

Three Wether Lambs.

1st—J. W. Lee & Sons.
2nd—J. A. Cerswell.
3rd—W. E. Wright.

Carcass of Yearling Wether.

1st—J. A. Cerswell.
2nd—A. Stevenson.
3rd—A. Stevenson.

Carcass of Lamb Wether.

1st—J. W. Lee & Sons.
2nd—J. A. Cerswell.
3rd—A. Stevenson.

SHROPSHIRE SPECIAL PRIZES.

Pure Bred Wether, 1 year and under 2.

1st—J. W. Lee & Sons.
2nd—W. E. Wright.
3rd— J. W. Lee & Sons.

Pure-Bred Wether, under 1 year.

1st—J. & D. J. Campbell.
2nd—J. & D. J. Campbell.
3rd—J. & D. J. Campbell.

Three Pure-Bred Wethers, under 1 year.

1st—J. & D. J. Campbell.
2nd—J. & D. J. Campbell.
3rd—W. E. Wright.

Grade Wether, 1 year and under 2, Sired by a Registered Shropshire Ram.

1st—J. & D. J. Campbell.
2nd—J. & D. J. Campbell.
3rd—J. & D. J. Campbell.

Grade Wether, under 1 year, Sired by a Registered Shropshire Ram.

1st, 2nd, 3rd—J. & D. J. Campbell.

Southdown. Special Prizes.

Ewe, under 1 year.

1st—Telfer Bros.
2nd and 3rd—Geo. Baker.

Three Ewes, under 1 year.

1st and 2nd—Geo. Baker.

Pen, three Ewe Lambs, under 1 year, get of one ram and bred by Exhibitor.

1st—Geo. Baker.
2nd—R. McEwen.

Wether, 1 year and under 2.

1st—R. McEwen.
2nd and 3rd—Geo. Baker.

Wether, under 1 year.

1st, 2nd and 3rd—R. McEwen.

Pen of three Wethers, under 1 year.

1st—R. McEwen.

Dorset-Horn. Special Prizes.

Wether, 1 year and under 2.

1st—W. E. Wright.
2nd—R. H. Harding.

Wether, under 1 year.

1st—R. H. Harding.
2nd—W. E. Wright.

Ewe, under 1 year.

1st and 2nd—R. H. Harding.

Best Wether, any age.

1st— W. E. Wright.

Lincoln, Special Prizes.

Ewe Lamb, Bred in Ontario.

1st, 2nd and 3rd—J. T. Gosnell.

Three Ewe Lambs, Bred in Ontario.

1st—J. T. Gosnell.
2nd—E. Parkinson.

SWINE.

YORKSHIRES.

Barrow, 6 months and under 9. Eight entries.

1st—R. F. Duck & Son, Port Credit. March 8th, 1908. Sire, Cedar Lodge Challenge, 22728; dam, Lakeview Queen 3rd, 15912.

2nd—Jos. Featherston & Son, Streetsville. Pine Grove Rufford. Sire, Pine Grove Fashion, 5th, 20800; dam, Pine Grove Ruffa Belle, 10th, 21378.

3rd—J. E. Brethour, Burford.

4th—R. F. Duck & Son. Sire, Cedar Lodge Challenge, 22728; dam, Lakeview Queen, 3rd, 15912.

5th—Jos. Featherston & Son. Pine Grove Rufford, 2nd. Sire, Pine Grove, Fashion, 5th, 20800; dam, Pine Grove Ruffa Belle, 10th, 21378.

Barrow, under 6 months. Six entries.

1st—R. F. Duck & Son. June 10th, 1908. Sire, Cedar Lodge Challenge, 22728; dam, Lakeview Jennie, 3rd, 17706.

2nd—Jos. Featherston & Son. Pine Grove Della, June 3rd, 1908. Sire, Pine Grove Fashion, 3rd, 20800; dam, Pine Grove Sendella, 16th, 26534.

3rd—Jos. Featherston & Son. Pine Grove Della, 2nd, June 3rd, 1908. Sire, Pine Grove Fashion, 3rd, 20800; dam, Pine Grove Sendella, 16th, 26534.

4th—James Wilson & Sons, Fergus. Sire, Broomhouse Mediate, 20328; dam, Monkland Jess, 13th, 23687.

Sow, 9 months and under 15. Seven entries.

1st—J. E. Brethour. Oaklodge Lily, 26842, September 4th, 1907. Sire, Helbon Trump, 17436; dam, Oaklodge Lilly, 4th, 23565.

2nd—James Wilson & Sons. Monkland Jess, 14th, 26003, December 20th, 1907.

3rd—James Wilson & Son. Monkland Jess, 15th, 26004, December 20th, 1907.

4th—Jos. Featherston & Sons. Pine Grove Rufford Belle, 33rd, 26629, October 10th, 1907. Sire, Pine Grove Beau 2nd, 21605; dam, Pine Grove Rufford Belle, 10th, 21378.

5th—J. E. Brethour. O. L. Maiden, 48th, 26857, September 1st, 1907. Sire, O. L. Manifesto, 23272; dam, O. L. Maiden, 41st, 21277.

Sow, 6 months and under 9. Eleven entries.

1st—Jos. Featherston & Son. Pine Grove Rufford Belle, 40th, 26059, April 3rd, 1908. Sire, P. G. Fashion, 3rd, 20800; dam, P. G. Rufford Belle, 2nd, 18858.

2nd—J. E. Brethour. Oaklodge Cinderella, 242, 26843, March 3rd, 1908. Sire, Oak Lodge Quaker, 1860; dam, Oak Lodge Cinderella, 144, 13673.

3rd—J. E. Brethour. Oak Lodge Cinderella, 243, 26844, March 3rd, 1908. Sire, Oak Lodge Quaker, 1860; dam, Oak Lodge Cinderella, 144, 13673.

4th—R. F. Duck & Son. Lake View Queen Jewel, 2nd, 26741, March 8th, 1908. Sire, Cedar Lodge Challenge, 22728; dam, Lakeview Queen, 3rd, 15912.

5th—Jos. Featherston & Son. Pine Grove Rufford Belle, 39th, 26058; April 10th, 1908. Sire, P. G. Fashion, 3rd, 20800; dam, P. G. Rufford Belle, 2nd, 18858.

Sow, under 6 months. Thirteen entries.

1st—J. E. Brethour. Oak Lodge Violet, 26th, 26845, June 2nd, 1908. Sire, Oak Lodge Quaker, 18604; dam, Oak Lodge Violet 8th, 19027.

2nd—J. E. Brethour. Oak Lodge Violet, 27th, 26846, June 2nd, 1908. Sire, Oak Lodge Quaker, 18604; dam, Oak Lodge Violet 8th, 19027.

3rd—Donald Gunn & Son, Beaverton. Dunrobin Bessie, 3rd, 26803, June 7th, 1908. Sire, Summer Hill Victor, 24491; dam, Dunrobin Bessie, 2nd, 26800.

4th—James Wilson & Sons. Monkland Betsy, 26754, June 3rd, 1908.

5th—R. F. Duck & Son. Lakeview Sunbeam, 26739, June 10th, 1908. Sire, Cedar Lodge Challenge, 22728; dam, Lakeview Jennie, 3rd, 17706.

Three Pigs of one Litter, Bred by Exhibitor. Seven entries.

1st—J. E. Brethour.
2nd—Jos. Featherston & Son.
3rd—James Wilson & Sons.
4th—R. F. Duck & Son.

Best Barrow shown by an amateur exhibitor.

1st—D. Gunn & Son.

Best Sow shown by an amateur exhibitor.

1st—D. Gunn & Son

BERKSHIRES.

Barrow, 6 months and under 9. Seven entries.

1st—John Kelly, Shakespeare. Bill, March 11th, 1908. Sire, Oak Park Topper, 18841; dam, Shakespeare Queen, 13170.

2nd—Herman Koelln & Son, Glen Allen. March 3rd, 1908. Sire, Concord Master, 14595; dam, River View Minnie, 18850.

3rd—E. Brien & Son, Ridgetown. Brien A., March 15th, 1908. Sire, Perfection (Imp.), 9801; dam, Princess, 16828.

4th—E. Brien & Son. Brien B., March 15th, 1908. Sire, Perfection (Imp.), 9801; dam, Princess, 16828.

5th—W. W. Brownridge, Ashgrove, Sam., April 10th, 1908. Sire, Sovereign D., 19818; dam, Countess of Wadford, 24th, 20306.

Barrow, under 6 months. Six entries.

1st—W. W. Brownridge. Sally, June 1st, 1908. Sire, Sally's Ensign, 17628; dam, Compton Lizzie, 20304.

2nd—John S. Cowan Donegal. Fairview Lad, June 2nd, 1908. Sire, Tom, 17266; dam, Maple Lodge Belle, 17225.

3rd—Herman Koelln & Son. June 4th, 1908. Sire, York Lodge Tom, 6th, 12285; dam, Doctor's Manor Lady, 18339.

4th—W. W. Brownridge. Sally's Fairboy, July 18th, 1908. Sire, Sally's Ensign, 17628; dam, Compton Mary, 20305.

5th—E. Brien & Son. Brien D., June 3rd, 1908. Sire, Perfection (Imp.), 9801; dam, Woodburn Emma, 16825.

Sow, 9 months and under 15. Five entries.

1st—W. W. Brownridge. Wandsworth Jean, 20440, September 6th, 1907. Sire, Polegate Beauty 2nd, 19431; dam, Countess of Wandsworth, 20306.

2nd—E. Brien & Son. Woodburn Jewel, 20327, November 10th, 1907. Sire, Perfection (Imp.), 9801; dam, Bonnie Maid, 13702

3rd—John S. Çowan. Fairview Rose Bud, 20467, December 12th, 1907. Sire, Tom, 17266; dam, Maple Lodge Belle, 17225.

4th—John S. Cowan. Fairview Prime Rose, 20468, December 12th, 1907. Sire, Tom, 17266; dam, Maple Lodge Belle, 17225.

Sow, 6 months and under 9. Fifteen entries.

1st—Joshua Lawrence, Oxford Centre. Oxford Daisy, 20389, March 9th, 1908. Sire, British Duke, 18376; dam, Durham's Dawn, 14722.

2nd—John Kelly. Kelly's, 34, 19677, March 11th, 1908. Sire, Oak Park Topper, 18841; dam, Shakespeare Queen, 13170.

3rd—W. W. Brownridge. Wandsworth Anna, 20444, April 10th, 1908. Sire, Sovereign D., 19818; dam, Countess of Wandsworth, 20306.

4th—W. W. Brownridge. Wandsworth Annie, 20445, April 10th, 1908. Sire, Sovereign D., 19818; dam, Countess of Wandsworth, 20306.

5th—John Kelly. Kelly's 35, 19678, March 11th, 1908. Sire, Oak Park Topper, 18841; dam, Shakespeare Queen, 13170.

Sow, under 6 months. Fourteen entries.

1st—W. W. Brownridge. Lucy, 20446, June 1st, 1908. Sire, Sally's Ensign, 17628; dam, Compton Lizzie, 20304.

2nd—Herman Koelln & Son. River View Naomi, 20428, June 4th, 1908. Sire, York Lodge Tom, 16th, 12285; dam, Doctor's Manor Lady, 18339.

3rd—W. W. Brownridge. Laura, 20447, June 1st, 1908. Sire, Sally's Ensign, 17628; dam, Compton Lizzie, 20304.

4th—Joshua Lawrence. Oxford Queen, 4th, 20395, June 15th, 1908. Sire, British Duke, 18376; dam, Oxford Queen, 17265.

5th—John S. Cowan. Fairview Charm, 20466, June 20th, 1908. Sire, Sunbeam, 19247; dam, Fairview Rose, 13727.

Three Pigs of one Litter, Bred by Exhibitor. Seven entries.

1st—W. W. Brownridge.
2nd—John Kelly.
3rd—W. W. Brownridge.
4th—Herman Koelln.

TAMWORTHS.

Barrow, 6 months and under 9. Five entries.

1st—Chas. Currie, Morriston. Morriston Tom, March 7th, 1908. Sire, Newcastle Choice, 3415; dam, Morriston Bessie, 4452.

2nd—D. Douglas & Sons, Mitchell. Rex, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

3rd—D. Douglas & Sons. Lucky Boy, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

4th—Chas. Currie. Morriston Timothy, March 7th, 1908. Sire, Newcastle Choice, 3415; dam, Morriston Bessie, 4452.

5th—D. Douglas & Sons. Arnold, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

Barrow, under 6 months. Five entries.

1st—Chas. Currie. Morriston Jack, June 4th, 1908. Sire, Knowle King David, 5226; dam, Morriston Lady, 5201.

2nd—D. Douglas & Sons. Major, July, 1908. Sire, Troy Boy, 2792; dam, Sal, 4344.

3rd—D. Douglas & Sons. Bill, July, 1908. Sire, Troy Boy, 2792; dam, Sal, 4344.

4th—D. Douglas & Sons. Bob, July, 1908. Sire, Troy Boy, 2792; Dam, Sal, 4344.

5th—Chas. Currie. Morriston John, June 4th, 1908. Sire, Knowle King David, 5266; dam, Morriston Lady, 5201.

Sow, 9 months and under 15. Five entries.

1st—D. Douglas & Sons. Maple Hurst Hazel, 5717, October 25th, 1907. Sire, Morriston George, 4806; dam, Maple Hurst Daisy, 4341.

2nd—Chas. Currie. Morriston Sadie, 5499, September 2nd, 1907. Sire, Newcastle Choice, 3415; dam, Thrifty Pink, 3871.

3rd—D. Douglas & Sons. Maple Hurst Lena, 5718, October 25th, 1907. Sire, Morriston George, 4806; dam, Maple Hurst Daisy, 4341.

4th—D. Douglas & Sons. Maple Hurst Dinah, 5719, October 25th, 1907. Sire, Morriston George, 4806; dam, Maple Hurst Daisy, 4341.

5th—Chas. Currie. Morriston Sibby, 5501, September 2nd, 1907, Sire, Newcastle Choice, 3415; dam, Thrifty Pink, 3871.

Sow, 6 months and under 9. Six entries.

1st—D. Douglas & Sons. Maple Hurst Bertha, 5720, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

2nd—Chas. Currie. Morriston Belle, 5737, March 7th, 1908. Sire, Newcastle Choice, 3415; dam, Morriston Bessie, 4452.

3rd—Chas. Currie. Morriston Bertha, 5736, March 7th, 1908. Sire, Newcastle Choice, 3415; dam, Morriston Bessie, 4452.

4th—D. Douglas & Sons. Maple Hurst Primrose, 5721, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

5th—D. Douglas & Son. Maple Hurst Empress, 5722, April, 1908. Sire, Maple Hurst King, 3904; dam, Maple Hurst Mina, 4861.

Sow, under 6 months. Seven entries.

1st—D. Douglas & Sons. Maple Hurst Hannah, 5723, July, 1908. Sire, Troy Boy, 2792; dam, Sal, 4344.

2nd—Chas. Currie. Morriston Ella, 5740, June 4th, 1908. Sire, Knowle King David, 5226; dam, Morriston Lady, 5201.

3rd—Chas. Currie. Morriston Edith, 5741, June 4th, 1908. Sire, Knowle King David, 5226; dam, Morriston Lady, 5201.

4th—D. Douglas & Sons. Maple Hurst Cora, 5724, July, 1908. Sire, Troy Boy, 2792; dam, Sal, 4344.

5th—D. Douglas & Son. Maple Hurst Stella, 5725, July, 1908. Sire, Troy Boy, 2792; dam, Sal, 4344.

Three Pigs of one Litter, bred by Exhibitor. Three entries.

1st—D. Douglas & Sons.
2nd—Chas. Currie.
3rd—D. Douglas & Sons.

CHESTER WHITES.

Barrow, 6 months and under 9. Two entries.

1st—Daniel DeCourcy, Bornholm. Ned, March 4th, 1908. Sire, Burnside Standard, 3204; dam, Tessie, 3370.

2nd—Daniel DeCourcy. Fred, March 4th, 1908. Sire, Burnside Standard, 3204; dam, Tessie, 3370.

Barrow, under 6 months. Two entries.

1st—Daniel DeCourcy. Jack, June 1st, 1908. Sire, Silver Jack, 4341; dam, White Bunty, 3073.

2nd—Daniel DeCourcy. Jill, June 1st, 1908. Sire, Silver Jack, 4341; dam, White Bunty, 3073.

Sow, 9 months and under 15. Two entries.

1st—Daniel DeCourcy. Lady A., 5156, September 20th, 1907. Sire, Silver Jack, 4341; dam, Tessie, 3370.

2nd—Daniel DeCourcy. Lady B., 5157, September 20th, 1907. Sire, Silver Jack, 4341; dam, Tessie, 3370.

Sow, 6 months and under 9. Two entries.

1st—Daniel DeCourcy, Lady C., 5158, March 4th, 1908. Sire, Burnside Standard, 3204; dam, Tessie, 3370.

2nd—Daniel DeCourcy, Lady D., 5159, March 4th, 1908. Sire, Burnside Standard, 3204; dam, Tessie, 3370.

Sow, under 6 months. Three entries.

1st—Daniel DeCourcy. Model Sow 4, 5214. Sire, Silver Jack, 4341; dam, White Bunty, 3073.

2nd—Daniel DeCourcy. Model Sow, 2, 5215. Sire, Silver Jack, 4341; dam, White Bunty, 3073.

3rd—Daniel DeCourcy. 5216. Sire, Silver Jack, 4341; dam, White Bunty, 3073.

Three Pigs of one Litter, Bred by Exhibitor. Two entries.

1st—Daniel DeCourcy, Bornholm.
2nd—Daniel DeCourcy, Bornholm.

ANY OTHER BREED, GRADE OR CROSS.

Barrow, 6 months and under 9. Eleven entries.

1st—Chas. Currie, Morriston.
2nd—R. F. Duck & Son, Port Credit.
3rd—D. Douglas & Sons, Mitchell.
4th—E. Brien & Sons, Ridgetown.
5th—A. O'Neil & Son, Birr.
6th—A. O'Neil & Son, Birr.

Barrow, under 6 months. Thirteen entries.

1st—R. F. Duck & Son, Port Credit.
2nd—Daniel DeCourcy, Bornholm.
3rd—W. W. Brownbridge, Ashgrove.
4th—D. Douglas & Sons, Mitchell.
5th—John S. Cowan, Donegal.
6th—A. O'Neil & Son, Birr.

Sow, 6 months and under 9. Eleven entries.

1st—R. F. Duck & Son, Port Credit.
2nd—Jos. Featherston & Son, Streetsville.
3rd—D. Douglas & Sons, Mitchell.
4th—D. Douglas & Sons, Mitchell.
5th—Chas. Currie, Morriston.
6th—R. Houston, Dixie.

Sow, under 6 months. Twelve entries.

1st—W. W. Brownridge, Ashgrove.
2nd—Chas. Currie, Morriston.
3rd—D. Douglas & Sons, Mitchell.
4th—Daniel DeCourcy, Bornholm.
5th—John S. Cowan, Donegal.
6th—John S. Cowan, Donegal.

EXPORT BACON HOGS.

Two Pure-Breds. Twenty-five entries.

1st—J. E. Brethour, Burford.
2nd—Jos. Featherston & Sons, Streetsville.
3rd—D. Douglas & Sons, Mitchell.
4th—R. F. Duck & Son, Port Credit.
5th—Jas. Wilson & Sons, Fergus.
6th—Jos. Featherston & Sons, Streetsville.
7th—Chas. Currie, Morriston.
8th—R. F. Duck & Son, Port Credit.
9th—J. E. Brethour, Burford.
10th—D. Douglas & Sons, Mitchell.
11th—J. E. Brethour, Burford.

Two Grades or Crosses. Eighteen entries.

1st—R. F. Duck & Sons, Port Credit.
2nd—J. E. Brethour, Burford.
3rd—Jos. Featherston & Sons, Streetsville.
4th—Jas. Wilson & Son, Fergus.
5th—R. F. Duck & Son, Port Credit.
4th—Jos. Featherston & Sons, Streetsville.
7th—J. E. Brethour, Burford.

Two Best Export Bacon Hogs.

1st—J. E. Brethour, Burford.

DRESSED CARCASSES.

Two Pure-Breds. Twenty-two entries.

1st—Jos. Featherston & Sons, Streetsville.
2nd—Jos. Featherston & Sons, Streetsville.
3rd—J. E. Brethour, Burford.
4th—D. Douglas & Sons, Mitchell.
5th—R. F. Duck & Son, Port Credit.
6th—J. E. Brethour, Burford.
7th—R. F. Duck & Son, Port Credit.
8th—J. E. Brethour, Burford.
9th—R. F. Duck & Son, Port Credit.
10th—Jos. Featherston & Sons, Streetsville.
11th—Donald Gunn & Son, Beaverton.

Two Grades or Crosses. Seventeen entries.

1st—Jos. Featherston & Sons, Streetsville.
2nd—R. F. Duck & Son, Port Credit.
3rd—R. Houston, Dixie.
4th—Jos. Featherston & Sons, Streetsville.
5th—Chas. Currie, Morriston.
6th—R. Houston, Dixie.
7th—R. Houston, Dixie.

Two Best Carcasses.

1st—Jos. Featherston & Sons, Streetsville.

JUDGING COMPETITION.

Beef Cattle. Forty-eight entries.

1st—R. J. Allen, O.A.C.
2nd—S. Kennedy, O.A.C.
3rd—W. N. Campbell, O.A.C.
4th—A. D. Campbell, O.A.C.
5th—M. S. Middleton, O.A.C.
6th—Angus McMillan, O.A.C.
7th—R. G. Thomson, O.A.C.
8th—A. M. Shaw, O.A.C.
9th—A. McTaggart, O.A.C.
10th—W. R. Reek, O.A.C.

Dairy Cattle. Forty-nine entries.

1st—R. B. Coglan, O.A.C.
2nd—R. Schuyler.
3rd—C. M. Learmouth, O.A.C.
4th—G. S. Dunkin, O.A.C.
5th—A. McTaggart, O.A.C.
6th—S. H. Culp, O.A.C.
7th—C. Rebsch, O.A.C.
8th—M. N. Baldwin, O.A.C.
9th—C. L. Palmer, O.A.C.
10th—R. H. Pilsworth, O.A.C.

Sheep. Twenty-eight entries.

1st—D. H. Kelly, Shakespeare.
2nd—S. Kennedy, O.A.C.
3rd—W. H. Irvin, O.A.C.
4th—J. F. Harries, O.A.C.
5th—J. E. Rettie, O.A.C.
6th—C. Main, O.A.C.
7th—R. G. Thompson, O.A.C.
8th—C. F. McEwen, Byron.
9th—J. C. Young, O.A.C.
10th—Gordon A. Burns, Paris.

Swine. Thirty-one entries.

1st—J. S. Howell. O.A.C.
2nd—W. H. Irvin. O.A.C.
3rd—M. McArthur, O.A.C.
4th—Gordon A. Burns, Paris.
5th—W. G. Orvis, O.A.C.
6th—F. Forsyth, O.A.C
7th—W. Toole, O.A.C.
8th—H. A. Cowie, O.A.C.
9th—R. R. Moore, O.A.C.
10th—M. N. Baldwin, O.A.C.

SEEDS.

Fall Wheat, White. Eleven entries.

1st—T. Baker & Son, Solina.
2nd—Andrew Schmidt, Mildmay.
3rd—Geo N. Harris, Lynden.
4th—Walter Hartman, Clarksburg.

Fall Wheat, Red or Amber. Seven entries.

1st—Jas. Snetsinger, Eamers' Corners.
2nd—Andrew Schmidt, Mildmay.
3rd—Isaac T. Knight & Co., Arkell.
4th—D. H. Taylor, Corwhin.

Spring Wheat. Four entries.

1st—A. R. Wood, Fergus.
2nd—Walter Hartman, Clarksburg.
3rd—Thomas B. Lush, Barrie Hill.

Goose Wheat. Four entries.

1st—Thomas B. Lush, Barrie Hill.
2nd—A. R. Wood, Fergus.
3rd—S. A. Northcott, Taunton.
4th—Andrew Harmer, Plattsville.

Oats, White. Twenty entries.

1st—Jas. Snetsinger, Eamers' Corners.
2nd—Andrew Schmidt, Mildmay.
3rd—Wm. Lewis, Dunsford.
4th—T. Baker & Son, Solina.

Oats, Black. Four entries.

1st—Thos. B. Lush, Barrie Hill.
2nd—Andrew Schmidt, Mildmay.
3rd—N. P. Schmidt, Mildmay.
4th—G. B. Hood, Guelph.

Barley, Six-Rowed. Twelve entries.

1st—Walter Hartman, Clarksburg.
2nd—Jas. Snetsinger, Eamers' Corners.
3rd—N. P. Schmidt, Mildmay.
4th—G. N. Harris, Lynden.

Field Peas, Large. Two entries.

1st—Wm. W. Ramage, Thistle.
2nd—S. A. Northcott, Taunton.

Field Peas, Small. Ten entries.

1st—Robert Talbot, Everton.
2nd—Peter McLaren, Hillsburg.
3rd—Edward Buckland, Fergus.
4th—S. A. Northcott, Taunton.

Red Clover. Six entries.

1st—S. A. Northcott, Taunton.
2nd—Andrew Schmidt, Mildmay.
3rd—J. A. Fletcher, Valetta.
4th—Geo. Baker, Simcoe.

Alsike. Two entries.

1st—Geo. Baker, Simcoe.
2nd—S. A. Northcott, Taunton.

Timothy. Three entries.

1st—Walter Hartman, Clarksburg.
2nd—S. A. Northcott, Taunton.

Potatoes, Long White Type. Eleven entries.

1st—Richard Houston, Dixie.
2nd—A. R. Woods, Fergus.
3rd—A. R. Wood, Fergus.
4th—Edward Buckland, Fergus.

Potatoes, Round White Type. Nine entries.

1st—F. W. Krouse, Guelph.
2nd—Peter McLaren, Hillsburg.
3rd—Jas. Snetsinger, Eamers' Corners.
4th—H. E. Alton, Jr., Everton.

Potatoes, Other than White. Ten entries.

1st—Scanlon Bros., Ennotville.
2nd—Isaac T. Knight & Co., Arkell.
3rd—D. H. Taylor, Corwhin.
4th—Jas. Snetsinger, Eamers' Corners.

Corn, Flint, Eight-Rowed Variety. Twelve entries.

1st—Geo. Baker, Simcoe.
2nd—L. D. Hankinson, Grovesend.
3rd—W. J. Fuller, Leamington.
4th—D. W. Campbell, Snelgrove.

Corn, Flint, Twelve Rowed Variety. Seven entries.

1st—Edward Smith, Ridgetown.
2nd—D. W. Campbell, Snelgrove.
3rd—Arch. MacColl, Aldboro.
4th—W. J. Campbell, Snelgrove.

Corn, Dent, White. Nine entries.

1st—G. W. Coatsworth & Son, Kingsville.
2nd—B. A. Smith, Ruthven.
3rd L. C. Palmer, Kingsville.
4th—J. O. Duke. Olinda.

Corn, Dent, Yellow. Four entries.

1st—A. H. Woodbridge, Kingsville.
2nd—G. W. Coatsworth & Son, Kingsville.
3rd—John P. Pearce, Staples.
4th—J. A. Fletcher, Valetta.

SPECIAL PRIZES OF THE CANADIAN SEED GROWERS' ASSOCIATION.

Fall Wheat, Exhibited of Hand-Selected Plants. One entry.

1st—Wm. Lewis, Dunsford.

Fall Wheat, Group Exhibits. Three entries.

1st—C. R. Gies, Heidelberg.
2nd—Herbert Davidson, Mount Nemo.

Spring Wheat, Group Exhibits. One entry.

1st—Robert McKay, Maxville.

Oats, White, Exhibits of Hand-Selected Plants. Four entries.

1st—John Hunter, Wyoming.
2nd—C. R. Gies, Heidelburg.
3rd—Arch. MacColl, Aldboro.
4th—Wm. Lewis, Dunsford.

Oats, White, Group Exhibits. Two entries.

1st—Duncan Carmichael, Jr., West Lorne.
2nd—Wm. W. Ramage, Thistle.

Barley, Six-Rowed, Exhibits of Hand-Selected Plants. Two entries.

1st— C. R. Gies, Heidelburg.
2nd—Arch. MacColl, Aldboro.

Barley, Six-Rowed, Group Exhibits. Three entries.

1st—Duncan Carmichael, Jr., West Lorne.
2nd—Duncan Carmichael, Jr., West Lorne.

Corn, Best Ten ears, any Eight-Rowed Variety. Flint, Three entries.

1st—L. D. Hankinson, Grovesend.

Corn, Best Ten ears, any Twelve-Rowed Variety, Flint. One entry.

1st—Edward Smith, Ridgetown.

Corn, Best Ten ears, any Variety Dent, White. Three entries.

1st—Jos. C. Thomas, Blytheswood.
2nd—John Hunter, Wyoming.

Corn, Best Ten ears, any Variety Dent, Yellow. Four entries.

1st—G. W. Coatsworth & Son, Kingsville.
2nd—A. H. Woodbridge, Kingsville.
3rd—John P. Pearce, Staples.
4th—Duncan Carmichael, Jr., West Lorne.

Corn, Best Ten ears, any Variety Sweet Corn (Late). Two entries.

1st—H. & J. McKee, Norwich.
2nd—J. O. Duke, Olinda.

Corn, Best Ten ears, any Variety Sweet Corn (Early). Two entries.

1st—Chas. Pearce, Wellington.

Wheat, any Spring Variety shown by a Beginner. One entry.

1st—Walter Hartman, Clarksburg.

Wheat, any Fall Variety shown by a Beginner. One entry.

1st—Duncan Carmichael, Jr., West Lorne.

Oats, any White Variety shown by a Beginner. One entry.

1st—Duncan Carmichael, Jr., West Lorne.

Barley, any Six-Rowed Variety shown by a Beginner. One entry.

1st—Walter Hartman, Clarksburg.

Corn, Ten ears, any Eight-Rowed Variety Flint shown by a Beginner. Three entries.

1st—Robt. Thompson, St. Catharines.
2nd—J. O. Duke, Olinda.
3rd—W. J. Fuller, Leamington.

Corn, Ten ears, any Variety White Dent shown by a Beginner. One entry.

1st—B. A. Smith, Ruthven.

Corn, Ten ears, any Variety Yellow Dent shown by a Beginner. One entry.

1st—Arch. MacColl, Aldboro.

Corn, Ten ears, any variety Sweet Corn (Late) shown by a Beginner. One entry.

1st—Duncan Carmichael, Jr., West Lorne.

Corn, Ten ears, any Variety Sweet Corn (Early) shown by a Beginner. One entry.

1st—J. O. Duke, Olinda.

Potatoes, Round, White Type, shown by a Beginner. One entry.

1st—Geo. N. Harris, Lynden.

Best Bushel of Alsike Clover Seed. Special.

1st—Geo. Baker, Simcoe.

Best Exhibit of Twenty-five ears of Dent Corn Grown in Ontario. Special.

1st—G. W. Coatsworth & Son, Kingsville.

Best Exhibit of Twenty-five ears of Flint Corn grown in Ontario. Special.

1st—Edward Smith, Ridgetown.

Sweepstakes, Special for Member making the most Creditable showing of Selected Seed for the Whole Exhibition.

1st—Duncan Carmichael, Jr., West Lorne.

DAIRY TEST.

Name of Animal and Exhibitor.	Lbs. Milk.	Per cent. fat.	Lbs. fat.	Lbs. solids not fat.	Points for day's milking.	Points for fat.	Points for solids not fat.	Total points.
Class 50, Sec. 1.—Shorthorn Cow, 48 months and over.								
1st. Kentucky Queen, 38948, James Brown, Norval	141.57	3.3	4.67	13.61	....	116.82	40.84	157.66
2nd. White Rose, 34931, James Brown, Norval	122.71	3.3	4.13	11.51	2	103.39	34.54	139.84
Class 50, Sec. 2.—Shorthorn Cow, 36 months and under 48.								
1st. Lady Guelph, 76721, James Brown, Norval	100.19	4.	4.	9.80	4	100.19	29.42	133.61
Class 50, Sec. 3.—Shorthorn Heifer, under 36 months.								
1st. Butterfly Rose, 81642, James Brown, Norval	98.44	4.1	4.06	9.95	3	101.59	29.87	134.46
2nd. Kilblean Beauty 2nd, 75426, James Brown, Norval	84.34	3.8	3.28	8.30	1	82.10	24.91	108.02
3rd. Gracie Guynes 3rd, 85218, Jno. Kelly, Shakespeare	71.25	4.5	3.23	7.36	2	80.92	22.10	105.02
Class 51, Sec. 1.—Ayrshire Cow, 48 months and over.								
1st. Rosalie of Hickory Hill, N. Dyment, Clappison	147.36	4.	5.89	14.42	....	147.36	43.27	190.63
2nd. Sarah's 2nd, 13192, H. & J. McKee, Norwich	165.01	3.4	5.71	15.72	....	142.97	47.19	190.16
3rd. Victoria, 13788, H. & J. McKee, Norwich	151.49	3.6	5.60	15.09	....	140.05	45.29	185.34
Class 51, Sec. 2.—Ayrshire Cow, 36 months and under 48.								
1st. Star's Nancy, 20138, H. & J. McKee, Norwich	122.09	3.9	4.80	11.68	....	120.09	35.06	155.15
Class 51, Sec. 3.—Ayrshire Heifer, under 36 months.								
1st. Queen Jessie of Spring Hill, 21166, H. & J. McKee, Norwich	108.33	4.1	4.47	10.91	....	111.87	32.74	144.61
2nd. Star's Sarah, 21541. H. & J. McKee, Norwich	105.62	4.	4.23	10.19	3	105.75	30.57	139.32
3rd. Beauty of Hickory Hill, N. Dyment, Clappison	93.45	3.5	3.29	8.80	....	82.49	26.42	108.91
Class 52, Sec. 1.—Holstein Cow, 48 months and over.								
1st. Lady Aggie DeKol, 4127, M. L. Haley, Springford	203.38	3.7	7.59	17.99	....	189.83	53.99	243.82
2nd. Evergreen March, 3896, G. W. Clemons, St. George	187.88	3.7	7.07	16.16	1	176.79	48.50	226.29
3rd. Idaline Pauline DeKol, 57127, Geo. Rice, Tilsonburg	197.26	3.3	6.57	17.95	4	165.41	53.85	223.26
4th. Netherland DeKol Glenice, 68355, G. Rice, Tilsonburg	163.13	2.9	4.73	13.82	....	118.26	41.46	159.73
5th. Lady Bess Boon, 63752, G. Rice, Tilsonburg	161.95	2.5	4.15	14.93	....	103.91	44.82	148.73
Class 52, Sec. 2.—Holstein Cow, 36 months and under 48.								
1st. Iantha Jewel Posch. 4596, Jas. Rettie, Norwich	211.18	2.9	6.19	18.97	....	154.97	56.91	211.89
2nd. Pontiac Atlas Maid, Jas. Rettie, Norwich	160.39	3.6	5.93	15.57	....	148.25	46.74	194.99
Class 52, Sec. 3.—Holstein Heifer, under 36 months.								
1st. Eloree, 6959, Jas. Rettie, Norwich	157.	4.	6.38	15.26	....	159.59	45.80	205.30
2nd. Queen Butter Baroness, 7652, M. L. Haley, Springford	110.70	4.2	4.72	10.45	5	118.02	31.36	154.38
3rd. Queen's Butter Girl, 8815, G. Rice, Tilsonburg	114.33	3.8	4.36	11.29	....	109.23	33.87	143.10
4th. Arah Veeman, 98698, G. Rice, Tilsonburg	126.31	3.3	4.25	11.64	....	106.32	34.94	141.27
5th. Marcena Jewel, 9081, Jas. Rettie, Norwich	104.01	2.9	3.05	9.51	....	76.27	23.55	104.82
Class 53, Sec. 1.—Jersey Cow, 48 months and over.								
1st. Cantata of Normanby, A.J.C.C., 158437, B. H. Bull & Sons, Brampton	130.20	4.6	6.11	12.80	....	152.88	38.42	191.31
Class 55. Sec. 2.—Grade Cow, 36 months and under 48.								
1st. Daisy D., M. L. Haley, Springford	133.69	3.8	5.21	12.79	....	132.75	38.39	171.15

POULTRY.

LIST GIVES NUMBER OF ENTRIES AND AWARDS IN EACH SECTION.

For Post Office address of Exhibitors, see page 283.

LIGHT BRAHMAS.

Cocks, 9.—1st and 2nd. H. W. Partlo; 3rd, John W. Jarvis.
Hens, 12.—1st, 2nd, 3rd, and 4th, H. W. Partlo.
Cockerels, 8.—1st and 2nd, H. W. Partlo; 3rd, Mrs. Chas. Waters.
Pullets, 7.—1st and 2nd, H. W. Partlo; 3rd, John W. Jarvis.

DARK BRAHMAS.

Cocks, 4.—1st and 3rd, L. C. Sage; 2nd, C. H. Wilson.
Hens, 4.—1st, Jas. Snetsinger; 2nd and 3rd, L. C. Sage.
Cockerels, 6.—1st and 2nd, C. A. R. Tilt; 3rd, Fred Bunt.
Pullets, 5.—1st, L. C. Sage; 2nd, C. A. R. Tilt; 3rd, C. H. Wilson.

BUFF COCHINS.

Cocks, 5.—1st, Holmhurst Poultry Yards; 2nd, Hugh Wyatt; 3rd, J. Alvin Small.
Hens, 7.—1st, Hugh Wyatt; 2nd, E. M. Deverell; 3rd, Holmhurst Poultry Yards.
Cockerels, 7.—1st and 3rd, Hugh Wyatt; 2nd, Holmhurst Poultry Yards.
Pullets, 7.—1st, and 2nd, Hugh Wyatt; 3rd, Holmhurst Poultry Yards.

PARTRIDGE COCHINS.

Cocks, 3.—1st, C. H. Wilson; 2nd, F. Wales; 3rd, Richard Oke.
Hens, 2.—1st, Richard Oke; 2nd, F. Wales.
Cockerels, 4.—1st, Richard Oke; 2nd, John Handley; 3rd, F. Wales.
Pullets, 5.—1st and 3rd, F. Wales; 2nd, John Handley.

BLACK COCHINS.

Cocks, 2.—1st, C. A. R. Tilt.
Hens, 2.—1st and 2nd, C. A. R. Tilt.
Cockerels, 1.—1st, C. A. R. Tilt.
Pullets, 1.—1st, C. A. R. Tilt.

WHITE COCHINS.

Cocks, 2.—1st and 2nd, Hy. Emrick.
Hens, 2.—1st and 2nd, Hy. Emrick.
Cockerels, 2.—1st, Harry T. Lush; 2nd, Hy. Emrick.
Pullets, 2.—1st, Hy. Emrick; 2nd, Harry T. Lush.

BLACK LANGSHANS.

Cocks, 3.—1st, C. A. R. Tilt; 2nd and 3rd, R. McCurdy.
Hens, 4.—1st and 2nd, C. A. R. Tilt; 3rd, R. McCurdy.
Cockerels, 5.—1st and 3rd, R. McCurdy; 2nd, C. A. R. Tilt.
Pullets, 10.—1st and 3rd, C. A. R. Tilt; 2nd, R. McCurdy.

A. O. C. LANGSHANS.

Cocks, 2.—1st and 2nd, L. Ridler.
Hens, 3.—1st, 2nd, and 3rd, L. Ridler.
Cockerels, 3.—1st, 2nd, and 3rd, L. Ridler.
Pullets, 3.—1st, 2nd, and 3rd, L. Ridler.

BARRED PLYMOUTH ROCKS.

Cocks, 23.—1st, 4th, and 5th, I. K. Millard; 2nd and 3rd, John Pringle.

Hens, 22.—1st and 3rd, I. K. Millard; 2nd and 5th, John Pringle; 4th, Chas. Hockin.

Cockerels, 38.—1st, Chas. Hall & Son; 2nd, 3rd, 7th, and 8th, I. K. Millard; 4th, John Pringle; 5th, and 6th, Chas. Hockin; 9th, John Bedford; 10th, Elias Snyder.

Pullets, 40.—1st, 6th, and 9th, John Pringle; 2nd and 5th, Chas. Hockin; 3rd and 8th, I. K. Millard; 4th, Geo. F. Holden; 7th, Jas. Hodge; 10th, Leslie Kerns.

WHITE PLYMOUTH ROCKS.

Cocks, 24.—1st, 3rd, and 5th, John L. Brown; 2nd, J. A. Carroll; 4th, Thos. Rice.

Hens, 35.—1st, C. J. Whitney; 2nd, Wm. E. Hoggarth; 3rd, 4th and 5th, Geo. A. Robertson; 6th, 9th, and 10th, John L. Brown; 7th, Gilbert Allen; 8th, J. A. Carroll.

Cockerels, 34.—1st and 8th, Wm. E. Hoggarth; 2nd and 9th, John L. Brown; 3rd, Fred. A. Andrewes; 4th, 6th, 7th, and 10th, Geo. A. Robertson.

Pullets, 40.—1st, 3rd, 4th, and 7th, Geo. A. Robertson; 2nd and 9th, John L. Brown; 5th, Guy Bell; 6th, Geo. E. Munroe; 8th, Thos. Rice; 10th, F. A. Andrewes.

BUFF PLYMOUTH ROCKS.

Cocks, 3.—1st and 3rd, John Bawden; 2nd, J. M. Campbell.

Hens, 3.—1st and 2nd, John Bawden; 3rd, J. M. Campbell.

Cockerels, 6.—1st and 3rd, John Bawden; 2nd, J. M. Campbell.

Pullets, 5.—1st and 2nd, John Bawden; 3rd, J. M. Campbell.

GOLDEN LACED WYANDOTTES.

Cocks, 13.—1st, Jas. Ford & Son; 2nd, John MacPherson; 3rd and 4th, J. H. Magill.

Hens, 9.—1st and 3rd, J. H. Magill; 2nd, John MacPherson.

Cockerels, 15.—1st, Peep O'Day Poultry Farm; 2nd and 4th, J. H. Magill; 3rd, Wm. Daniel.

Pullets, 16.—1st, J. H. Magill; 2nd, John MacPherson; 3rd, A. W. Graham; 4th, Wm. Daniel.

SILVER LACED WYANDOTTES.

Cocks, 13.—1st, Peep O'Day Poultry Farm; 2nd, Maple Leaf Poultry Yards; 3rd, Alfred Flawn.

Hens, 17.—1st, Hintonburg Poultry Yards; 2nd, Jas. Arthur; 3rd, Peep O'Day Poultry Farm; 4th, Wm. Daniel.

Cockerels, 18.—1st, Wilbur Lemon; 2nd and 3rd, Alfred Flawn; 4th, J. E. Moyer.

Pullets, 20.—1st, 2nd, and 3rd, Hintonburg Poultry Yards; 4th, Peep O'Day Poultry Farm; 5th, Alfred Flawn.

BLACK WYANDOTTES.

Cocks, 6.—1st, G. & J. Bogue; 2nd, R. Dinner; 3rd, Joe. R. Smith.

Hens, 8.—1st, R. Dinner; 2nd, G. & J. Bogue; 3rd, A. & T. Readwin.

Cockerels, 4.—1st, Joe R. Smith: 2nd, Wilbert Levan; 3rd, Joe R. Smith.

Pullets, 9.—1st and 3rd, Joe R. Smith; 2nd, A. & T. Readwin.

BUFF WYANDOTTES.

Cocks, 6.—1st, Spry & Mick; 2nd, J. C. Sanderson; 3rd, Jas. Dundas.

Hens, 9.—1st, J. Hughes Samuel; 2nd, Geo. Elliott & Co., 3rd, J. C Sanderson.

Cockerels, 7.—1st, Spry & Mick; 2nd, Jas. Dundas; 3rd, J. C. Sanderson.

Pullets, 19.—1st, J. C. Sanderson; 2nd, Spry & Mick; 3rd, C. M. Taylor; 4th, J. Hughes Samuel.

SILVER PENCILLED WYANDOTTES.

Cocks, 4.—1st, C. M. Evans; 2nd, Rev. W. N. Scott; 3rd, Erhard Loehr.

Hens, 4.—1st, Rev. W. N. Scott; 2nd, Erhard Loehr; 3rd, C. M. Evans

Cockerels, 2.—1st, Robt. Patterson; 2nd, C. M. Evans.

Pullets, 5.—1st and 2nd, C. M. Evans; 3rd, Robt. Patterson.

WHITE WYANDOTTES.

Cocks, 36.—1st, 2nd, 3rd, and 9th, John S. Martin; 4th, Norman McLeod; 5th and 8th, A. Devitt; 6th, J. A. Carroll; 7th, W. Dawson; 10th, J. H. Traplin.

Hens, 51.—1st, 2nd, 9th and 10th, John S. Martin; 3rd and 4th, Jos. Russell; 5th, Chas. Massie; 6th, J. A. Carroll; 7th, Norman McLeod; 8th, W. Dawson.

Cockerels, 62.—1st, 2nd and 6th, John S. Martin; 3rd, Wm. Archer; 4th, Chas. Massie; 5th, Jos. Russell; 7th, W. Dawson; 8th, J. A. Carroll; 9th, Wm. Wilson; 10th, Norman McLeod.

Pullets, 67.—1st, 2nd, 3rd, and 9th, John S. Martin; 4th and 6th, Norman McLeod; 5th, Chas. Massie; 7th and 10th, W. Dawson; 8th, Wm. Archer.

PARTRIDGE WYANDOTTES.

Cocks, 7.—1st, F. T. Adams; 2nd, J. E. Fidler; 3rd, A. Goebel.
Hens, 8.—1st and 3rd, J. E. Fidler; 2nd, F. T. Adams.
Cockerels, 12.—1st and 2nd, F. T. Adams; 3rd, G. Wilson Grieve; 4th, Peter P. Becker.
Pullets, 15.—1st and 3rd, S. Rundle; 2nd, G. Wilson Grieve; 4th, Peter P. Becker.

COLUMBIAN WYANDOTTES.

Cocks, 11.—1st and 2nd, T. H. Scott; 3rd, Jas. C. Montgomery.
Hens, 17.—1st and 4th, W. Dawson; 2nd, R. C. Middlemiss; 3rd, T. H. Scott.
Cockerels, 20.—1st and 4th, T. H. Scott; 2nd, W. Dawson; 3rd and 5th, Schelly Bros.
Pullets, 24.—1st, 2nd, and 4th, Schelly Bros.; 3rd and 5th, T. H. Scott.

DOMINIQUE.

Cocks, 3.—1st, G. B. Carbert; 2nd, E. Syer; 3rd, A. G. H. Luxton.
Hens, 4.—1st, Geo. Burn; 2nd, G. B. Carbett; 3rd, A. G. H. Luxton.
Cockerels, 4.—1st, E. Syer; 2nd, Geo. Burn; 3rd, G. B. Carbett.
Pullets, 3.—1st, G. B. Carbett; 2nd, E. Syer.

BLACK JAVAS.

Cocks, 3.—1st, Richard Oke; 2nd, J. H. Warrington; 3rd, F. W. Krouse.
Hens, 5.—1st, Richard Oke; 2nd and 3rd, Clayton Witler.
Cockerels, 6.—1st, Richard Oke; 2nd, G. & J. Bogue; 3rd, Clayton Witler.
Pullets, 8.—1st and 2nd, G. & J. Bogue; 3rd, J. H. Warrington.

MOTTLED JAVAS.

Cocks, 2.—1st, J. & G. Bogue; 2nd, Richard Oke.
Hens, 2.—1st, G. & J. Bogue; 2nd, Richard Oke.
Cockerels, 1.—1st, Richard Oke.
Pullets, 1.—1st, G. & J. Bogue.

S. C. RHODE ISLAND REDS.

Cocks, 8.—1st, Wm. J. Mihm; 2nd, John E. Klager; 3rd, E. Wankel & Son.
Hens, 8.—1st and 3rd, Wm. J. Mihm; 2nd, E. Wankel & Son.
Cockerels, 23.—1st, E. Wankel & Son; 2nd and 5th, Hughes & Taylor; 3rd, Wm. J. Mihm; 4th, Anthony R. Gendron.
Pullets, 22.—1st and 3rd, Hughes & Taylor; 2nd, E. Wankel & Son; 4th and 5th, Wm. J. Mihm.

R. C. RHODE ISLAND REDS.

Cocks, 11.—1st, and 2nd, Emil Wankel & Son; 3rd, A. W. Graham.
Hens, 7.—1st, Emil Wankel & Son; 2nd, John Lundy; 3rd, Hughes & Taylor.
Cockerels, 11.—1st, A. W. Graham; 2nd, Hughes & Taylor; 3rd, Emil Wankel & Son.
Pullets, 12.—1st and 2nd, Hughes & Taylor; 3rd, A. W. Graham; 4th, Richard Tew.

BLACK RED GAMES.

Cocks, 11.—1st and 3rd, S. Stapleford; 2nd, A. J. Grigg.
Hens, 12.—1st, W. J. Elliott; 2nd, S. Stapleford; 3rd, J. W. Roberts; 4th, Frank Cook & Son.
Cockerels, 8.—1st, W. J. Elliott; 2nd, Thos. Parrott; 3rd, J. W. Roberts.
Pullets, 10.—1st, J. W. Roberts; 2nd and 3rd, Thos. Parrott.

BROWN RED GAMES.

Hens, 1.—1st, W. Barber. *Pullets, 2.*—1st and 2nd, W. Barber.

DUCKWING GAMES.

Cocks, 2.—1st and 2nd, W. Barber.
Hens, 3.—1st, and 2nd, W. Barber,; 3rd, Frank Cook & Son.
Cockerels, 4.—1st and 3rd, Frank Cook & Son; 2nd, W. Barber.
Pullets, 2.—1st and 2nd, W. Barber.

PYLE GAMES.

Cocks, 3.—1st, W. Barber; 2nd and 3rd, J. W. Parkinson.
Hens, 4.—1st and 2nd, J. W. Parkinson; 3rd, W. Barber.
Cockerels, 8.—1st, 2nd and 3rd, J. W. Parkinson.
Pullets, 6.—1st, 2nd, and 3rd, J. W. Parkinson.

INDIAN GAMES, ANY VARIETY.

Cocks, 5.—1st, Finchamp & Topping; 2nd, Will Casey; 3rd, E. Syer.
Hens, 5.—1st, Will Casey; 2nd, Stephen Sellers; 3rd, Finchamp & Topping.
Cockerels, 8.—1st, E. Syer; 2nd and 3rd, Finchamp & Topping.
Pullets, 8.—1st and 2nd, Finchamp & Topping; 3rd, John Handley.

BLACK SUMATRA GAMES.

Cocks, 4.—1st, E. Saunders; 2nd and 3rd, Frank Shaw.
Hens, 4.—1st and 2nd, Frank Shaw; 3rd, E. Saunders.
Cockerels, 5.—1st, Frank Shaw; 2nd, E. Saunders; 3rd, C. J. Daniel.
Pullets, 6.—1st, C. J. Daniel; 2nd, Frank Shaw; 3rd, E. Saunders.

BIRCHEN GAMES.

Hens, 1.—1st, Geo. Burn.
Cockerels, 1.—1st, W. Barber.
Pullets, 2.—1st and 2nd, W. Barber.

A. O. V. GAMES.

Cocks, 3.—1st, Wm. Smith; 2nd, F. W. Krouse; 3rd, Geo. Burn.
Hens, 3.—1st and 2nd, Geo. Burn; 3rd, F. W. Krouse.
Cockerels, 4.—1st, Fred. Bunt; 2nd, L. Ridler; 3rd, Geo. Burn.
Pullets, 3.—1st, F. W. Krouse; 2nd, Geo. Burn; 3rd, Fred. Bunt.

R. C. WHITE LEGHORNS.

Cocks, 10.—1st, Irvin K. Martin; 2nd, Wm. Telfer; 3rd, Jas. Snetsinger.
Hens, 9.—1st, M. R. Hoover; 2nd, A. & T. Readwin; 3rd, Wm. Telfer.
Cockerels, 14.—1st, M. R. Hoover; 2nd, A. McLeod; 3rd and 4th, W. J. Bell.
Pullets, 17.—1st and 4th, W. J. Bell; 2nd, Wm. Telfer; 3rd, A. & T. Readwin.

S. C. WHITE LEGHORNS.

Cocks, 9.—1st and 2nd, Wm. Ferguson; 3rd, E. Syer.
Hens, 12.—1st and 4th, Wm. Ferguson; 2nd, Durst Bros.; 3rd, Jos. Harrison.
Cockerels, 20.—1st and 3rd, Wm. Ferguson; 2nd and 5th, F. Wales; 4th, Wm. E. Hoggarth.
Pullets, 25.—1st and 2nd, F. Wales; 3rd and 5th, Wm. Ferguson; 4th, Durst Bros.

BLACK LEGHORNS.

Cocks, 6.—1st and 3rd, A. E. Doan; 2nd, F. W. Hodgkin.
Hens, 13.—1st and 4th, A. E. Doan; 2nd, Geo. Burn; 3rd, J. H. Edsall.
Cockerels, 11.—1st, W. J. McLeod; 2nd, F. H. Gallinger; 3rd, A. E. Doan.
Pullets, 16.—1st, W. J. McLeod; 2nd and 4th, A. E. Doan; 3rd, F. H. Gallinger.

R. C. BROWN LEGHORNS.

Cocks, 8.—1st, Wm. Cadman; 2nd, C. H. Wilson; 3rd, Henderson & Billings.
Hens, 7.—1st and 2nd, C. H. Wilson; 3rd, Henderson & Billings.
Cockerels, 10.—1st and 2nd, Henderson & Billings; 3rd, C. H. Wilson.
Pullets, 14.—1st and 2nd, Wm. Cadman; 3rd, E. Saunders; 4th, Fred Bunt.

S. C. BROWN LEGHORNS.

Cocks, 15.—1st, Jas. S. McDairmid; 2nd, H. F. Becker; 3rd, Jacob Streib; 4th, A. J. Engel.

Hens, 18.—1st and 5th, W. A. Gurney; 2nd, Jacob Streib; 3rd, Jas. Snetsinger; 4th, H. F. Becker.

Cockerels, 41.—1st, W. A. Gurney; 2nd, A. J. Engel; 3rd, 6th, 9th, and 10th, H. F. Becker; 4th and 8th, Jacob Streib; 5th, John Handley; 7th, Peter Scott.

Pullets, 25.—1st, W. A. Gurney; 2nd and 4th, Orr & Creedon; 3rd, H. F. Becker; 5th, Harvey B. Yakes.

BUFF LEGHORNS.

Cocks, 7.—1st and 3rd, Nate K. Cornwall; 2nd, E. Jeffries.

Hens, 8.—1st and 2nd, Nate K. Cornwall; 3rd, Jas. Dundas.

Cockerels, 11.—1st and 3rd, Nate K. Cornwall; 2nd, R. B. Graham.

Pullets, 13.—1st, R. B. Graham; 2nd, 3rd and 4th, Nate K. Cornwall.

SPANISH.

Cocks, 2.—1st, G. & J. Bogue; 2nd, J. H. Warrington.

Hens, 3.—1st, J. H. Warrington; 2nd, G. & J. Bogue; 3rd, Stephen Sellers.

Cockerels, 3.—1st and 2nd, G. & J. Bogue; 3rd, J. H. Warrington.

Pullets, 3.—1st, J. H. Warrington; 2nd and 3rd, G. & J. Bogue.

S. C. BLACK MINORCAS.

Cocks, 7.—1st and 3rd, T. A. Faulds; 2nd, Chas. Gorvett.

Hens, 17.—1st, 2nd, and 3rd, Henry Dunne; 4th, Jos. Harrison.

Cockerels, 17.—1st, 2nd, and 4th, T. A. Faulds; 3rd W. J. Elliott.

Pullets, 15.—1st and 4th, T. A. Faulds; 2nd, Henry Dunne; 3rd, G. C. Cook.

R. C. BLACK MINORCAS.

Cocks, 8.—1st, T. A. Faulds; 2nd, B. J. Mountjoy; 3rd, Dr. J. N. MacRae.

Hens, 7.—1st and 2nd, T. A. Faulds; 3rd, T. H. Scott.

Cockerels, 7.—1st, 2nd, and 3rd, T. A. Faulds.

Pullets, 8.—1st, 2nd, and 3rd, T. A. Faulds.

WHITE MINORCAS.

Cocks, 2.—1st, A. C. Moyer; 2nd, J. C. Read.

Hens, 4.—1st, J. C. Read; 2nd and 3rd, A. C. Moyer.

Cockerels, 5.—1st, A. C. Moyer; 2nd and 3rd, Thos. Vickers.

Pullets, 6.—1st and 3rd, A. C. Moyer; 2nd, Thos. Vickers.

ANDALUSIANS.

Cocks, 7.—1st, H. V. Cosh; 2nd and 3rd, G. T. Howard.

Hens, 10.—1st and 2nd, H. V. Cosh; 3rd, Adolph Smith.

Cockerels, 6.—1st, H. V. Cosh; 2nd, Chas. Gorvett; 3rd, G. T. Howard.

Pullets, 6.—1st and 3rd, Chas. Gorvett; 2nd, G. T. Howard.

SILVER GREY DORKINGS.

Cocks, 9.—1st,Gordon A. Burns; 2nd, Harry McKee; 3rd, Wallace McGlennon.

Hens, 14.—1st, Jas. M. McCormack, 2nd, Wallace McGlennon; 3rd, F. W. Krouse; 4th, Gordon A. Burns.

Cockerels, 6.—1st and 3rd, Gordon A. Burns; 2nd, Jas. M. McCormack.

Pullets, 7.—1st and 2nd, Gordon A. Burns; 3rd, Jas. M. McCormack.

COLORED DORKINGS.

Cocks, 3.—1st, Jas. M. McCormack; 2nd, J. H. Warrington; 3rd, G. & J. Bogue.

Hens, 3.—1st, G. & J. Bogue; 2nd, Jas. M. McCormack; 3rd, J. H. Warrington.

Cockerels, 3.—1st, Jas. M. McCormack; 2nd and 3rd, G. & J. Bogue.

Pullets, 4.—1st and 2nd, Jas. McCormack; 3rd, G. & J. Bogue.

WHITE DORKINGS.

Cocks, 3.—1st and 2nd, Jas. M. McCormack; 3rd, J. H. Warrington.
Hens, 3.—1st, Geo. Burn; 2nd, J. H. Warrington; 3rd, Jas. M. McCormack.
Cockerels, 4.—1st, Jas. M. McCormack; 2nd, Geo. Burn; 3rd, J. H. Warrington.
Pullets, 4.—1st and 2nd, Jas. M. McCormack; 3rd, Geo. Burn.

BUFF ORPINGTONS.

Cocks, 17.—1st, P. E. Aird; 2nd and 3rd, A. W. E. Hellyer; 4th, H. A. Hoffman.

Hens, 22.—1st and 3rd, Robert Barnes; 2nd and 4th, A. W. E. Hellyer; 5th, P. E Aird.

Cockerels, 47.—1st, 2nd, 3rd, and 6th, H. A. Hoffman; 4th, 7th, and 8th, A. W. E. Hellyer; 5th and 10th, John Bawden; 9th, P. J. McEwen.

Pullets, 41.—1st, 4th, and 5th, A. W. E. Hellyer; 2nd and 10th, H. A. Hoffman; 3rd, Robert Barnes; 6th, Milne & Cavanagh; 7th, John Bawden; 8th, Harry T. Lush; 9th, C. C. Abbott.

BLACK ORPINGTONS.

Cocks, 13.—1st and 2nd, H. A. Hoffman; 3rd, Kemp & Waterman; 4th, E. Fraleigh.

Hens, 13.—1st, 3rd, and 4th, E. Fraleigh; 2nd, C. J. Daniels.

Cockerels, 23.—1st. H. A. Hoffman; 2nd, E. Fraleigh; 3rd, Richard Oke; 4th, Kemp & Waterman; 5th, Chester Scoyne.

Pullets, 28.—1st and 2nd, Kemp & Waterman; 3rd and 5th, H. A. Hoffman; 4th, E. Fraleigh.

WHITE ORPINGTONS.

Cocks, 4.—1st, Jas. Snetsinger; 2nd, Gideon Peer; 3rd, Frank E. Bogart.
Hens, 10.—1st, 2nd, and 3rd, Moore Bros.
Cockerels, 7.—1st, 2nd, and 3rd, Moore Bros.
Pullets, 7.—1st, 2nd, and 3rd, Moore Bros.

HOUDANS.

Cocks, 4—1st, E. O. Penwarden; 2nd, Geo. Elliott & Co.; 3rd, McIntosh & Halliday.

Hens, 4—1st, E. O. Penwarden; 2nd, G. & J. Bogue; 3rd, Geo. Elliott & Co.
Cockerels, 6—1st and 2nd, G. & J. Bogue; 3rd, McIntosh & Halliday.
Pullets, 8—1st and 2nd, G. & J. Bogue; 3rd, E. O. Penwarden.

CREVE COEURS.

Cocks, 1—1st, G. & J. Bogue.
Hens, 3—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Richard Oke.
Cockerels, 2—1st, Richard Oke; 2nd, G. & J. Bogue.
Pullets, 2—1st, G. & J. Bogue.

LA FLECHE.

Cocks, 3—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Richard Oke.
Hens, 3—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Richard Oke.
Cockerels, 2—1st, Richard Oke; 2nd, G. & J. Bogue.
Pullets, 2—1st, G. & J. Bogue; 2nd, Richard Oke.

W. C. B. POLANDS.

Cocks, 3—1st, Wm. McNeil; 2nd and 3rd, J. Alvin Small.
Hens, 2—1st and 2nd, Wm. McNeil.
Cockerels, 2—1st and 2nd. Wm. McNeil.
Pullets, 2—1st and 2nd, Wm. McNeil.

GOLDEN POLANDS.

Cocks, 3—1st and 3rd, Wm. McNeil; 2nd. G. & J. Bogue.
Hens, 3—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.
Cockerels, 2—1st, G. & J. Bogue; 2nd, Wm. McNeil.
Pullets, 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.

SILVER POLANDS.

Cocks, 4—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.
Hens, 4—1st and 2nd, Wm. McNeil; 3rd, Geo. Burn.
Cockerels, 4—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Pullets, 4—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.

WHITE POLANDS.

Cocks, 1—1st, Wm. McNeil.
Hens, 2—1st and 2nd, Wm. McNeil.
Cockerels, 1.—1st,Wm. McNeil.
Pullets, 2—1st and 2nd, Wm. McNeil.

GOLDEN BEARDED POLANDS.

Cocks, 3—1st, Wm. McNeil; 2nd, G. & J. Bogue; 3rd, J. Alvin Small.
Hens, 4—1st, J. Alvin Small; 2nd and 3rd, Wm. McNeil.
Cockerels, 3—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.
Pullets, 3—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.

SILVER BEARDED POLANDS.

Cocks, 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Hens, 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Cockerels, 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Pullets. 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.

WHITE BEARDED POLANDS.

Cocks, *2*—1st and 2nd, Wm. McNeil.
Hens, 2—1st and 2nd, Wm. McNeil.
Cockerels. 2—1st and 2nd, Wm. NcNeil.
Pullets, 2—1st and 2nd, Wm. McNeil.

BUFF LACED POLANDS.

Cocks, 3—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.
Hens, 3—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.
Cockerels. 2—1st, G. & J. Bogue; 2nd, Wm. McNeil.
Pullets, 3—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.

GOLDEN SPANGLED HAMBURGS.

Cocks, 3—1st, G. & J. Bogue; 2nd, Richard Oke; 3rd, Jas. Baptie.
Hens, 4—1st, 2nd, and 3rd, Jas. Baptie.
Cockerels, 4—1st and 2nd, Richard Oke; 3rd, Jas. Baptie.
Pullets, 2—1st, Richard Oke; 2nd. Jas. Baptie.

SILVER SPANGLED HAMBURGS.

Cocks, 8—1st, Richard Oke; 2nd, Harry T. Lush; 3rd, Jas. Baptie.
Hens, 7—1st, Richard Oke; 2nd, Harry T. Lush; 3rd, Wm. Cadman.
Cockerels. 8—1st and 2nd. Richard Oke; 3rd. Jas. Baptie.
Pullets, 8—1st, Harry T. Lush, 2nd, Wm. Cadman; 3rd, Richard Oke

GOLDEN PENCILLED HAMBURGS.

Cocks, 2—1st, Richard Oke; 2nd. John Ballantyne.
Hens, *2*—1st, Richard Oke; 2nd, Wm. Carter.
Cockerels. 3—1st and 3rd. Richard Oke; 2nd. Wm. Carter.
Pullets, *5*—1st and 2nd, Richard Oke; 3rd, Wm. Carter.

SILVER PENCILLED HAMBURGS.

Cocks, 3—1st, Wm. Carter; 2nd and 3rd, Richard Oke.
Hens, *3*—1st and 2nd, Richard Oke; 3rd, Wm. Carter.
Cockerels. 3—1st and 2nd, Richard Oke; 3rd, Wm. Carter.
Pullets 3—1st and 3rd, Richard Oke; 2nd, Wm. Carter.

BLACK HAMBURGS.

Cocks, 7—1st, R. L. Wheadon; 2nd, W. G. Murray; 3rd, Richard Oke.
Hens, 7—1st, W. F. Coote; 2nd and 3rd, Richard Oke.
Cockerels, 7—1st and 2nd, Richard Oke; 3rd, R. L. Wheadon.
Pullets, 8—1st, R. L. Wheadon; 2nd, Richard Oke; 3rd, Harry T. Lush.

RED CAPS.

Cocks, 4—1st and 2nd, Geo. W. Kinder.
Hens, 4—1st and 2nd, Geo. W. Kinder; 3rd, Wells Bros.
Cockerels, 6—1st, Wells Bros.; 2nd, W. E. Wright; 3rd, Geo. W. Kinder.
Pullets, 7—1st and 3rd, Wells Bros.; 2nd, W. E. Wright.

SULTANS.

Cocks, 2—1st, G. & J. Bogue; 2nd, Richard Oke.
Hens, 2—1st, Richard Oke; 2nd, G. & J. Bogue.
Cockerels, 1—1st, Richard Oke.
Pullets, 2—1st and 2nd, Richard Oke.

SILKIES.

Cocks, 5—1st and 2nd, E. Saunders; 3rd, H. B. Donovan.
Hens, 6—1st H. B. Donovan; 2nd, E. Saunders; 3rd, John Innes.
Cockerels, 6—1st, E. Saunders; 2nd, John Innes; 3rd, H. B. Donovan.
Pullets, 7—1st and 3rd, E. Saunders; 2nd, John Innes.

A. O. V. FOWL.

Cocks, 7—1st, Peter P. Becker; 2nd, Jack Philpot; 3rd, F. H. & P. L. Greer.
Hens, 9—1st, Geo. Burn; 2nd and 3rd, Peter P. Becker.
Cockerels, 7—1st, Peter P. Becker; 2nd, Rev. W. N. Scott; 3rd, Adolph Smith.
Pullets, 9—1st and 3rd, Peter P. Becker, 2nd, Rev. W. N. Scott.

BLACK RED GAME BANTAMS.

Cocks, 9—1st, W. R. Walker; 2nd, Chas. R. Crowe; 3rd, Rook Bros.
Hens, 10—1st and 3rd, W. R. Walker; 2nd, Chas. R. Crowe.
Cockerels, 9—1st, W. R. Walker; 2nd, Chas. R. Crowe; 3rd, Thos. Sherlock.
Pullets, 16—1st, 3rd and 4th, Chas. R. Crowe; 2nd, W. R. Walker.

BROWN RED GAME BANTAMS.

Cocks, 7—1st, W. R. Walker; 2nd, Thos. Sherlock; 3rd, W. Barber.
Hens, 12—1st, Thos. Sherlock; 2nd, W. R. Walker; 3rd, W. Barber; 4th, W. Pearson.
Cockerels, 7—1st, W. Barber; 2nd, J. A. Harper; 3rd, W. R. Walker.
Pullets, 10—1st, W. Barber; 2nd and 3rd, W. R. Walker.

DUCKWING GAME BANTAMS.

Cocks, 5—1st, W. Barber; 2nd, Chas. R. Crowe; 3rd, Thos. Sherlock.
Hens, 8.—1st, Chas. R. Crowe; 2nd and 3rd, Spieres Bros.
Cockerels, 7.—1st and 2nd, Spieres Bros.; 3rd, Chas. R. Crowe.
Pullets, 8.—1st, Spieres Bros.; 2nd, Chas. R. Crowe; 3rd, Thos. Sherlock.

PYLE GAME BANTAMS.

Cocks, 8—1st, John Crowe; 2nd, Tyson & McMaster; 3rd, Thos. Bower.
Hens, 12—1st, Tyson & McMaster; 2nd, W. Barber; 3rd, Thos. Bower; 4th, John Crowe.
Cockerels, 15—1st, 3rd and 4th, Thos. Bower; 2nd, John Crowe.
Pullets, 20—1st, W. Barber; 2nd, 3rd, and 4th, Thos. Bower; 5th, Tyson & McMaster.

WHITE GAME BANTAMS.

Cocks, 2—1st and 2nd, H. B. Donovan.
Hens, 3—1st, 2nd and 3rd, H. B. Donovan.
Cockerels, 3—1st, 2nd and 3rd, H. B. Donovan.
Pullets, 3—1st, 2nd and 3rd, H. B. Donovan.

BIRCHEN GAME BANTAMS.

Cocks, 3—1st, H. B. Donovan; 2nd, Rook Bros.; 3rd, J. E. Bailey.
Hens, 7—1st, W. Pearson; 2nd, Tyson & McMaster; 3rd, H. B. Donovan.
Cockerels, 5—1st, 2nd, and 3rd, Rook Bros.
Pullets, 6—1st, Rook Bros.; 2nd and 3rd, W. Pearson.

INDIAN GAME BANTAMS.

Cocks, 4—1st, W. G. Murray; 2nd and 3rd, Doidge & McNeil.
Hens, 5—1st, T. J. Kiley; 2nd, Doidge & McNeil; 3rd, Alfred Flawn.
Cockerels, 3—1st, Doidge & McNeil; 2nd, T. J. Kiley; 3rd, H. B. Donovan.
Pullets, 4—1st and 2nd, Doidge & McNeil; 3rd, T. J. Kiley.

A. O. V. GAME BANTAMS.

Cocks, 5—1st, P. E. Aird; 2nd, J. V. MacAree; 3rd, H. B. Donovan.
Hens, 4—1st, P. E. Aird; 2nd, Geo. Burn; 3rd, H. B. Donovan.
Cockerels, 2—1st and 2nd, H. B. Donovan.
Pullets. 9—1st, Rook Bros.; 2nd, W. R. Walker; 3rd, Chas. R. Crowe.

GOLDEN SEBRIGHT BANTAMS.

Cocks, 7—1st, Richard Oke 2nd, G. & H. Poole; 3rd, W. G. Murray.
Hens, 7—1st, Richard Oke; 2nd, W. G. Murray; 3rd, T. J. Kiley.
Cockerels, 7—1st, and 3rd, T. J. Kiley: 2nd, W. G. Murray.
Pullets. 8—1st, Richard Oke; 2nd, W. G. Murray; 3rd, W. J. Slessor.

SILVER SEBRIGHT BANTAMS.

Cocks, 11—1st, Richard Oke; 2nd and 3rd, W. G. Murray.
Hens, 10—1st, Richard Oke; 2nd and 3rd, T. J. Kiley.
Cockerels, 8—1st and 2nd, Richard Oke; 3rd, L. Austin Brill.
Pullets, 7—1st and 3rd. Richard Oke; 2nd, L. Austin Brill.

BLACK ROSE COMB BANTAMS.

Cocks, 12—1st, Richard Oke; 2nd, W. J. Slessor; 3rd, W. G. Murray; 4th, R. L. Wheadon.
Hens, 14—1st, W. G. Murray; 2nd and 3rd, R. L. Wheadon.
Cockerels, 14—1st, Richard Oke; 2nd and 4th, R. L. Wheadon; 3rd, W. G. Murray.
Pullets, 14—1st and 3rd, R. L. Wheadon; 2nd, Richard Oke; 4th, W. J. Sleesor.

WHITE ROSE COMB BANTAMS.

Cocks, 6.—1st and 2nd, W. G. Murray; 3rd, H. B. Donovan.
Hens, 7—1st, Richard Oke; 2nd and 3rd, H. B. Donovan.
Cockerels, 9—1st, W. G. Murray; 2nd, L. Austin Brill; 3rd, R. L. Wheadon.
Pullets, 10—1st, Richard Oke; 2nd and 3rd, W. G. Murray.

WHITE COCHIN BANTAMS.

Cocks, 8—1st, W. J. Teale; 2nd, Doidge & McNeil; 3rd, Joe. R. Smith.
Hens, 10.—1st, Joe. R. Smith; 2nd, Doidge & McNeil; 3rd, Dr. J. N. MacRae.
Cockerels, 5—1st, 2nd, and 3rd, Doidge & McNeil.
Pullets, 4—1st, 2nd, and 3rd, Doidge & McNeil.

BUFF COCHIN BANTAMS.

Cocks, 6—1st, Richard Oke; 2nd, and 3rd, Rosser Bros.
Hens, 8—1st, 2nd and 3rd. Rosser Bros.
Cockerels, 11—1st. Rosser Bros.; 2nd, J. A. Northey; 3rd, Doidge & McNeil.
Pullets, 11—1st, Rosser Bros.; 2nd, J. A. Northey; 3rd, Richard Oke.

Black Cochin Bantams.

Cocks, 14—1st, C. A. R. Tilt; 2nd and 3rd, Doidge & McNeil; 4th, Dr. J. N. MacRae.

Hens, 16—1st, Rosser Bros.; 2nd, H. Freleigh; 3rd, Doidge & McNeil; 4th, Dr. J. N. MacRae.

Cockerels, 15—1st, H. Fraleigh; 2nd and 3rd, W. J. Slessor; 4th, Doidge & McNeil.

Pullets, 16—1st and 3rd, W. J. Slessor; 2nd, H. Fraleigh; 4th, Joe. R. Smith.

Partridge Cochin Bantams.

Cocks, 6—1st, W. G. Murray; 2nd, L. Austin Brill; 3rd, Wm. Cadman.
Hens, 6—Wm. Cadman; 2nd, W. G. Murray; 3rd, L. Austin Brill.
Cockerels, 7—1st, Hugh Wyatt; 2nd, L. Austin Brill; 3rd, W. Pearson.
Pullets, 6—1st, Hugh Wyatt; 2nd, L. Austin Brill; 3rd, H. B. Donovan.

White Booted Bantams.

Cocks, 3—1st, W. J. Teale; 2nd, W. G. Murray; 3rd, T. J. Kiley.
Hens. 6—1st, W. J. Teale; 2nd and 3rd. T. J. Kiley.
Cockerels, 5—1st, and 3rd, W. G. Murray; 2nd, T. J. Kiley.
Pullets, 6—1st, T. J. Kiley; 2nd and 3rd, W. G. Murray.

Japanese Black-tailed Bantams.

Cocks, 4—1st, Richard Oke; 2nd, W. G. Murray; 3rd, T. J. Kiley.
Hens, 6.—1st and 3rd, Richard Oke; 2nd, W. G. Murray.
Cockerels, 4—1st and 3rd, W. G. Murray; 2nd, T. J. Kiley.
Pullets, 4—1st and 2nd, W. G. Murray; 3rd, T. J. Kiley.

Japanese White Bantams.

Cocks, 4—1st, Richard Oke; 2nd, W. G. Murray; 3rd, H. B. Donovan.
Hens, 4—1st, Richard Oke; 2nd, H. B. Donovan; 3rd, W. G. Murray.
Cockerels, 3—1st, Richard Oke; 2nd and 3rd. W. G. Murray.
Pullets, 3—1st, Richard Oke; 2nd and 3rd, W. G. Murray.

Black Japanese Bantams.

Cocks, 4—1st, Richard Oke; 2nd, W. G. Murray; 3rd, H. B. Donovan.
Hens, 5—1st, H. B. Donovan; 2nd, W. G. Murray; 3rd, L. Austin Brill.
Cockerels, 4—1st, Richard Oke; 2nd, L. Austin Brill.
Pullets, 5—1st, Richard Oke; 2nd and 3rd, W. G. Murray.

A. O. V. Japanese Bantams.

Cocks, 5—1st and 3rd, W. G. Murray; 2nd, Richard Oke.
Hens, 6—1st, Richard Oke; 2nd and 3rd. W. G. Murray.
Cockerels, 5—1st, H. B. Donovan; 2nd, W. Dawson.
Pullets, 4—1st, H. B. Donovan; 2nd, Richard Oke.

Polish Bearded Bantams.

Cocks, 5—1st and 3rd, T. J. Kiley; 2nd, W. G. Murray.
Hens, 5—1st and 2nd, T. J. Kiley; 3rd, W. G. Murray.
Cockerels. 5—1st, T. J. Kiley; 2nd and 3rd, Richard Oke.
Pullets, 5—1st, Richard Oke; 2nd and 3rd, T. J. Kiley.

Unbearded Polish Bantams.

Cocks, 4—1st, H. B. Donovan; 2nd, W. G. Murray; 3rd, Richard Oke.
Hens, 5—1st, H. B. Donovan; 2nd, W. G. Murray; 3rd, Richard Oke.
Cockerels, 4—1st, H. B. Donovan; 2nd and 3rd, W. G. Murray.
Pullets, 5—1st and 2nd, H. B. Donovan; 3rd, W. G. Murray.

Brahma Bantams.

Cocks, 8—1st, J. M. Shaw; 2nd, R. T. Dickie; 3rd, H. W. Partlo.
Hens, 13—1st, H. W. Partlo; 2nd, R. T. Dickie; 3rd, J. M. Shaw; 4th, G. E. McIntosh.
Cockerels, 9—1st, G. E. McIntosh; 2nd, Jack Hewitt; 3rd, H. W. Partlo.
Pullets, 12—1st, G. E. McIntosh; 2nd, J. M. Shaw; 3rd and 4th, H. W. Partlo.

A. O. V. Bantams.

Cocks, 1—1st, H. B. Donovan.
Hens, 1—1st, H. B. Donovan.
Pullets, 1—1st, T. J. Kiley.

Bronze Turkeys, 2 Years and up.

Cocks, 4—1st, W. J. Bell; 2nd, Alfred C. Crane; 3rd, W. H. Beatty; 4th, T. Worrod.
Hens, 8—1st, Jas. Ford & Son; 2nd, 3rd and 5th, W. J. Bell; 4th, Cullis & Lean.

Bronze Turkeys, Under 2 Years.

Cocks, 7—1st and 2nd, W. J. Bell; 3rd, A. McDougall & Son; 4th, W. E. Wright; 5th, D. Douglas & Son.
Hens, 8—1st, Jas. Ford & Son; 2nd, A. McDougall & Son; 3rd and 4th, W. J. Bell; 5th, W. E. Wright.
Cockerels, 13—1st, 2nd and 3rd, W. J. Bell; 4th, Jas. Ford & Son; 5th, A. McDougall & Son.
Pullets, 12—1st, W. E. Wright; 2nd, Jas. Ford & Son; 3rd, 4th and 5th, W. J. Bell.

White Turkeys.

Cocks, 5—1st, Baker Bros.; 2nd and 3rd, W. H. Beatty; 4th and 5th, Geo. Baker.
Hens, 6—1st and 2nd, Baker Bros.; 3rd and 4th, W. H. Beatty; 5th, Geo. Baker.
Cockerels, 7—1st and 2nd, Baker Bros.; 3rd, A. McDougall & Son; 4th and 5th, Geo. Baker.
Pullets, 6—1st, A. McDougall & Son; 2nd and 3rd, Baker Bros.; 4th, W. H. Beatty; 5th, Geo. Baker.

A. O. V. Turkeys.

Cocks, 2—1st, W. J. Alexander; 2nd, A. G. H. Luxton.
Hens, 3—1st and 2nd, W. J. Alexander; 3rd, A. G. H. Luxton.
Cockerels, 2.—1st, A. G. H. Luxton; 2nd, W. J. Alexander.
Pullets, 2—1st, W. J. Alexander; 2nd, A. G. H. Luxton.

Toulouse Geese.

Ganders, 5—1st, Geo. Burn; 2nd and 3rd, D. Douglas & Son; 4th, Scanlon Bros.
Geese, 4—1st and 2nd, D. Douglas & Son; 3rd, Scanlon Bros; 4th, Thos. M. Shea.
Ganders, 1908, 7—1st and 2nd, D. Douglas & Son; 3rd, Jas. M. McCormack; 4th, Thos. M. Shea.
Geese, 1908, 8—1st and 2nd, D. Douglas & Son; 3rd, Jas. M. McCormack; 4th, Scanlon Bros.

Embden Geese.

Ganders, 6—1st, C. A. R. Tilt; 2nd, Baker Bros.; 3rd and 4th, A. McDougall & Son.
Geese, 6—1st, Scanlon Bros.; 2nd, C. A. R. Tilt; 3rd, A. McDougall & Son; 4th, Scanlon Bros.
Ganders, 1908, 4—1st, C. A. R. Tilt; 2nd, Baker Bros.; 3rd, A. McDougall & Son; 4th, Scanlon Bros.
Geese, 1908, 3—1st, Scanlon Bros.; 2nd, C. A. R. Tilt; 3rd, A. McDougall & Son.

BROWN CHINESE GEESE.

Ganders, 3—1st, A. G. H. Luxton; 2nd, Geo. Burn; 3rd, G. B. Carbert.
Geese, 3—1st, Geo. Burn; 2nd, A. G. H. Luxton; 3rd, G. B. Carbert.
Ganders, 1908, 3—1st, C. A. R. Tilt; 2nd, G. B. Carbert.
Geese, 1908, 3—1st, C. A. R. Tilt; 2nd, G. B. Carbert.

AFRICAN GEESE.

Ganders, 5—1st, Baker Bros; 2nd, Geo. Burn; 3rd, C. A. R. Tilt.
Geese, 5—1st and 2nd, C. A. R. Tilt; 3rd, Geo. Burn.
Ganders, 1908, 2—1st, C. A. R. Tilt; 2nd, Baker Bros.
Geese, 1908, 2—1st, C. A. R. Tilt; 2nd, Baker Bros.

A. O. V. GEESE.

Ganders, 4—1st, Geo. Burn; 2nd, A. G. H. Luxton; 3rd, Isaac T. Knight & Co.
Geese, 4—1st, Geo. Burn; 2nd, A. G. H. Luxton; 3rd, Isaac T. Knight & Co.
Ganders, 1908, 4—1st, Stephen Sellers; 2nd, A. G. H. Luxton; 3rd, Thos. M. Shea.
Geese, 1908, 4—1st, Stephen Sellers; 2nd, A. G. H. Luxton; 3rd, Thos. M. Shea.

AYLESBURY DUCKS.

Drakes, 5—1st, C. A. R. Tilt; 2nd and 3rd, G. & J. Bogue.
Ducks, 6—1st and 2nd, G. & J. Bogue; 3rd, C. A. R. Tilt.
Drakes, 1908, 3—1st and 3rd, G. & J. Bogue; 2nd, Stephen Sellers.
Ducks, 1908, 3—1st and 2nd, G. & J. Bogue; 3rd, Stephen Sellers.

ROUEN DUCKS.

Drakes, 6—1st, Baker Bros; 2nd, G. & J. Bogue; 3rd, Will Casey.
Ducks, 6—1st and 2nd, G. & J. Bogue; 3rd, Baker Bros.
Drakes, 1908, 5—1st and 2nd, Baker Bros.; 3rd, G. & J. Bogue.
Ducks, 1908, 7—1st and 2nd, G. & J. Bogue; 3rd, Baker Bros.

PEKIN DUCKS.

Drakes, 8—1st and 2nd, C. A. R. Tilt; 3rd, D. Douglas & Son.
Ducks, 7—1st and 2nd, C. A. R. Tilt; 3rd, D. Douglas & Son.
Drakes, 1908, 10—1st and 2nd, C. A. R. Tilt; 3rd, Wm. Collins.
Ducks, 1908, 9—1st and 2nd, C. A. R. Tilt; 3rd, Stephen Sellers.

INDIAN RUNNER DUCKS.

Drakes, 4—1st, H. F. Wismer; 2nd and 3rd, S. D. Furminger.
Ducks, 4—1st, H. F. Wismer; 2nd and 3rd, S. D. Furminger.
Drakes, 1908, 5—1st and 2nd, S. D. Furminger; 3rd, H. F. Wismer.
Ducks, 1908, 5—1st and 2nd, S. D. Furminger; 3rd, H. F. Wismer.

CAYUGA DUCKS.

Drakes, 3—1st, G. & J. Bogue; 2nd, Isaac T. Knight & Co.
Ducks, 2—1st, Isaac T. Knight & Co.
Drakes, 1908, 3—1st and 2nd Isaac T. Knight & Co.
Ducks, 1908, 3—1st and 2nd, Isaac T. Knight & Co.

MUSCOVY DUCKS.

Drakes, 3—1st and 2nd, Isaac T. Knight & Co.; 3rd, Geo. Burn.
Ducks, 3—1st, Geo. Burn; 2nd and 3rd, Isaac T. Knight & Co.
Drakes, 1908, 3—1st, C. A. R. Tilt; 2nd, Geo. Burn; 3rd, Isaac T. Knight & Co.
Ducks, 1908, 3—1st, Geo. Burn; 2nd, Isaac T. Knight & Co. 3rd, C. A. R. Tilt.

A. O. V. DUCKS.

Drakes, 5—1st and 2nd, H. Karn; 3rd, H. B. Donovan.
Ducks, 5—1st and 3rd, H. Karn; 2nd, H. B. Donovan.
Drakes, 1908, 4—1st, and 2nd, H. Karn; 3rd, H. B. Donovan.
Ducks, 1908, 4—1st, H. B. Donovan; 2nd and 3rd, H. Karn.

PIGEONS.

Black Carrier.

Cocks, 3.—1st and 2nd, H. E. Limon.
Hens, 2—1st, H. E. Limon; 2nd, A. & T. Readwin.

Dun Carrier.

Cocks, 2—1st, H. E. Limon; 2nd, A. & T. Readwin.
Hens, 4—1st and 2nd, H. E. Limon.

A. O. S. C. Carrier.

Cocks, 2—1st and 2nd, H. E. Limon.
Hens, 2—1st and 2nd, H. E. Limon.

White Pouter.

Cocks, 4—1st, H. E. Limon; 2nd, J. H. Magill.
Hens, 6—1st, J. H. Magill; 2nd, H. E. Limon.

Blue Pied Pouter.

Cocks, 3—1st, J. H. Magill; 2nd, H. E. Limon.
Hens, 4—1st and 2nd, J. H. Magill.

Black Pied Pouter.

Cocks, 4—1st, J. H. Magill; 2nd, J. & T. Hatton.
Hens, 4—1st, J. H. Magill; 2nd, H. E. Limon.

Yellow or Red Pouter.

Cocks, 7—1st, H. E. Limon; 2nd, Chas. H. Currier.
Hens, 7—1st, J. H. Magill; 2nd, H. E. Limon.

Pigmy Pouter.

Cocks, 10—1st, H. E. Limon; 2nd, J. V. MacAree.
Hens, 10—1st, Chas. H. Currier; 2nd, H. E. Limon.

Muffed Tumbler.

Cocks, 11—1st, A. & T. Readwin; 2nd, Benson & Tregwin.
Hens, 10—1st, Alfred T. Ashby; 2nd, A. & T. Readwin.

L. F. Clean Leg Tumbler.

Cocks, 11—1st, J. V. MacAree; 2nd, A. & T. Readwin.
Hens, 9—1st, Bert Sheward; 2nd, Roy Osgoode.

S. F. Almond Tumbler.

Cocks, 5—1st and 2nd, Jack Elwood.
Hens, 2—1st, Jack Elwood; 2nd, A. & T. Readwin.

S. F., A. O. C. Tumbler.

Cocks, 4—1st, W. H. Reid; 2nd, Jack Elwood.
Hens, 5—1st, Jack Elwood; 2nd, J. & T. Hatton.

Red Barb.

Hens, 1—1st, A. & T. Readwin.

Black Barb.

Cocks, 3—1st and 2nd, Chas. H. Currier.
Hens, 3—1st, Chas. H. Currier; 2nd, L. Ridler.

WHITE TRUMPETER.

Cocks, 3—1st, L. Ridler; 2nd, J. & T. Hatton.
Hens, 3—1st, J. & T. Hatton; 2nd, L. Ridler.

A. O. S. C. TRUMPETER.

Cocks, 2—1st and 2nd, W. H. Reid. *Hens, 2*—1st and 2nd, W. H. Reid.

BLACK JACOBIN.

Cocks, 4—1st and 2nd, Benson & Tregwin.
Hens, 5—1st, W. H. Reid; 2nd, Benson & Tregwin.

RED OR YELLOW JACOBIN.

Cocks, 7—1st, Benson & Tregwin; 2nd, W. H. Reid.
Hens, 8—1st and 2nd, Chas. H. Currier.

WHITE JACOBIN.

Cocks, 9—1st, W. H. Reid; 2nd, Benson & Tregwin.
Hens, 7—1st, Howard Stewart; 2nd, Benson & Tregwin.

A. O. S. C. JACOBIN.

Cocks, 5—1st, J. & T. Hatton; 2nd, Benson & Tregwin.
Hens, 4—1st, W. H. Reid; 2nd, Benson & Tregwin.

ORIENTAL FRILL.

Cocks, 4—1st, Fred. Bell; 2nd, J. V. MacAree.
Hens, 5—1st, Chas. H. Currier; 2nd, Fred Bell.

SILVER DUN ANTWERP.

Cocks, 2—1st and 2nd, W. H. Reid. *Hens, 2*—1st and 2nd, W. H. Reid.

WHITE FANTAIL.

Cocks, 13—1st and 2nd, J. V. MacAree.
Hens, 12—1st, J. V. MacAree; 2nd, Geo. D. Trimble.

BLUE OR BLACK FANTAIL.

Cocks, 9—1st, Bert Sheward; 2nd, Douglas Mitchell.
Hens, 8—1st, W. H. Reid; 2nd, Bert Sheward.

A. O. S. C. FANTAIL.

Cocks, 6—1st, W. H. Reid; 2nd, Bert Sheward.
Hens, 7—1st, Bert Sheward; 2nd, Douglas Mitchell.

RED OR YELLOW MAGPIE.

Cocks, 4—1st, L. Ridler; 2nd, A. & T. Readwin.
Hens, 3—1st and 2nd, L. Ridler.

A. O. C. MAGPIE.

Cocks, 3—1st and 2nd, L. Ridler. *Hens, 3*—1st and 2nd, L. Ridler.

BLUE OR BLACK CHECKERED SHOW HOMER.

Cocks, 4—1st, Alfred Knight; 2nd, W. H. Reid.
Hens, 3—1st and 2nd, Alfred Knight.

A. O. C. SHOW HOMER.

Cocks, 2—1st and 2nd, Alfred Knight.
Hens, 4—1st, W. H. Reid; 2nd, Alfred Knight.

BLACK SWALLOW.

Cocks, 4—1st, W. H. Reid; 2nd, A. & T. Readwin.
Hens, 4—1st, W. H. Reid; 2nd, L. Ridler.

A. O. S. C. SWALLOW.

Cocks, 7—1st, L. Ridler; 2nd, Chas. H. Currier.
Hens, 4—1st, L. Ridler; 2nd, W. H. Reid.

A. O. C. SWALLOW.

Cocks, 3—1st, L. Ridler; 2nd, A. & T. Readwin.
Hens, 3—1st, L. Ridler; 2nd, W. H. Reid.

DRAGOON.

Cocks, 10—1st and 2nd, J. V. MacAree.
Hens, 6—1st, W. Steer; 2nd, L. Ridler.

ARCHANGEL.

Cocks, 5—1st, J. & T. Hatton; 2nd, A. & T. Readwin.
Hens, 5—1st, J. & T. Hatton; 2nd, A. & T. Readwin.

NUN.

Cocks, 5—1st, Douglas Mitchell; 2nd, A. & T. Readwin.
Hens, 5—1st and 2nd, Douglas Mitchell.

AFRICAN BLUE OR SILVER OWL.

Cocks, 3—1st, W. H. Reid; 2nd, Perry Hamm.
Hens, 2—1st and 2nd, Perry Hamm.

AFRICAN O. A. C. OWL.

Cocks, 6—1st and 2nd, Howard Stewart.
Hens, 7—1st, Howard Stewart; 2nd, W. H. Reid.

ENGLISH BLUE OR SILVER OWL.

Cocks, 3—1st and 2nd, Fred Bell. *Hens, 2*—1st and 2nd, Fred Bell.

ENGLISH A. O. C. OWL.

Cocks, 3—1st, Fred Bell; 2nd, A. & T. Readwin.
Hens, 2—1st and 2nd, Fred Bell.

A. O. V. OWL.

Cocks, 8—1st and 2nd, Howard Stewart. *Hens, 9.*—1st and 2nd, W. H. Reid.

BLACK TURBIT.

Cocks, 3—1st and 2nd, Bert Sheward. *Hens, 5*—1st and 2nd, Bert Sheward.

A. O. C. TURBIT.

Cocks, 5—1st, Fred Bell; 2nd, Bert Sheward.
Hens, 3—1st and 2nd, Bert Sheward.

A. O. S. VARIETY PIGEONS.

Cocks, 5—1st, A. & T. Readwin; 2nd, J. & T. Hatton.
Hens, 5—1st, J. & T. Hatton; 2nd, A. & T. Readwin.

ABYSSINIAN CAVIES.

Pair, 2—1st and 2nd, Wm. Fox.

PERUVIAN CAVIES.

Pair, 2—1st and 2nd, Wm. Fox.

SMOOTH COATED CAVIES.

Pair, 2—1st and 2nd, Wm. Fox.

A. O. V. RABBITS.

Male, 3—1st, L. Ridler; 2nd, J. M. Ballantyne.
Female, 1—1st, J. M. Ballantyne.

BELGIAN HARES.

Male, 4—1st and 2nd, Wm. Fox. *Female, 4*—1st and 2nd, Wm. Fox.

SCOTCH FANCY CANARIES.

Male, 2—1st and 2nd, F. W. Hodgkin. *Female, 2*—1st, and 2nd, F. W. Hodgkin.

A. O. V. CANARY.

Male, 2—1st and 2nd, F. W. Hodgkin. *Female, 2*—1st and 2nd, F. W. Hodgkin.

ENGLISH GOLDFINCH.

Male, 1—1st, J. M. Ballantyne.

PEN OF UTILITY FOWL.

Pen, 9—1st, Geo. A. Robertson; 2nd, Scanlon Bros.; 3rd, Guy Bell.

SELLING CLASS.

DORKINGS.

Males, 6—1st, Gordon A. Burns; 2nd, A. G. H. Luxton; 3rd, F. W. Krouse.
Females, 7—1st, R. L. Wheadon; 2nd, Gordon A. Burns; 3rd, Jas. M. McCormack.

PLYMOUTH ROCKS.

Males, 15—1st, Miss Z. [illegible]; 2nd, Geo. A. Robertson; 3rd, W. J. Alexander.
Females, 4—1st, M. R. Hoover; 2nd, H. Karn; 3rd, Jos. Foster.

WYANDOTTES.

Males, 9—1st, G. and H. Mack; 2nd, Kemp & Waterman; 3rd, Wilbur Lemon.
Females, 5—1st and 2nd, Kemp & Waterman; 3rd, Wilbur Lemon.

ORPINGTONS.

Males, 7—1st, Chester Scoyne; 2nd, H. A. Hoffman; 3rd, Robert Patterson.
Females, 5—1st, Kemp & Waterman; 2nd, Chester Scoyne; 3rd, R. L. Wheadon.

MINORCAS.

Males, 5—1st, 2nd, and 3rd, R. L. Wheadon.
Females, 3—1st and 2nd, R. L. Wheadon.

LEGHORNS.

Males, 8—1st, M. R. Hoover; 2nd, Peter Scott; 3rd, E. Syer.
Females, 4—1st, F. Wales; 2nd, D. Douglas & Son; 3rd, E. Syer.

RHODE ISLAND REDS.

Males, 7—1st, Jack Philpot; 2nd, W. A. McMaster; 3rd, R. L. Wheadon.
Females, 3—1st, W. Pearson; 2nd, Jack Philpot; 3rd, W. A. McMaster.

ASIATIC, ANY VARIETY.

Males, 4—1st and 3rd, R. McCurdy; 2nd, L. C. Sage.
Females, 2—1st, F. Wales; 2nd, L. C. Sage.

ANY OTHER VARIETY.

Males, 2—1st and 2nd, Wm. McNeil. *Females, 2*—1st and 2nd, Wm. McNeil.

DRESSED POULTRY.

Pair, Brahmas, 3—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Rock Cockerels, 13—1st, Mrs. W. Card; 2nd, Jos. Tomalin; 3rd, Johnson & Ogg.
Pair, Rock Pullets, 7—1st, J. E. Mounce; 2nd, Mrs. W. Card; 3rd, Matt. Wilson.
Pair, Wyandotte Cockerels, 11—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Wyandotte Pullets, 4—1st and 2nd, J. E. Mounce; 3rd, Johnson & Ogg.
Pair, Minorcas or Andalusians, 10—1st and 2nd, J. E. Mounce; 3rd, C. D. Worthington.
Pair, Leghorns, 9—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Dorkings, 3—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Houdans, La Fleche, Creve-Coeurs, any variety, 3—1st, 2nd, and 3rd, Scanlon Bros.
Pair, Games, 5—1st, 2nd, and 3rd, Geo. Fyfe.
Pair, Javas, 4—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Hamburgs, 3—1st, 2nd and 3rd, Scanlon Bros.
Pair, Orpington Cockerels, 9—1st, 2nd, and 3rd, J. E. Mounce.
Pair, Orpington Pullets, 6—1st, 2nd, and 3rd, J. E. Mounce.
Best Pair, Dressed Fowls, 5—1st, J. E. Mounce.
Turkey, any age, Male, 6—1st, 2nd, and 3rd, Woodrow & Sons.
Pair, Turkeys, any age, Female, 8—1st, and 3rd, Woodrow & Sons; 2nd, Jos. Tomalin.
Pair, Turkeys, 1908, Male, 10—1st. and 3rd, Woodrow & Sons; 2nd, Mrs. J. Miles.
Pair, Turkeys, 1908, Female, 8—1st, and 3rd, Woodrow & Sons; 2nd, Mrs. J. Miles.
Best Entry, Dressed Turkeys, 4—1st, Woodrow & Sons.
Pair, White Geese, 7—1st, Woodrow & Sons; 2nd and 3rd, Mrs. J. Miles.
Pair, Colored Geese, 8—1st and 2nd, Scanlon Bros.; 3rd, Woodrow & Sons.
Best Pair, Dressed Geese, 2—1st, Woodrow & Sons.
Pair, White Ducks, 7—1st, Isaac T. Knight & Co.; 2nd, Jos. Tomalin; 3rd, Woodrow & Sons.
Pair, Colored Ducks, 12—1st and 2nd, Woodrow & Sons; 3rd, Isaac T. Knight & Co.
Best Pair, Dressed Ducks, 4—1st, Isaac T. Knight & Co.
Six Brahmas, Cochins or Langshans, 1—1st, J. E. Mounce.
Six Rocks or Wyandottes, 9—1st and 3rd, J. E. Mounce; 2nd, Mrs. W. Card.
Six Minorcas, Andalusians, or Javas, 4.—1st, J. E. Mounce; 2nd, C. D. Worthington; 3rd, Mrs. W. Card.
Six Dorkings, Houdans, Creve-Coeurs, or Orpingtons, 6—1st, 2nd, and 3rd, J. E. Mounce.
Six Games, 2—1st, Geo. Fyfe; 2nd, Scanlon Bros.
Six Leghorns or Hamburgs, 4—1st, J. E. Mounce; 2nd and 3rd, Scanlon Bros.
Six Turkeys, 1908, 7—1st, Woodrow & Sons; 2nd, Mrs. J. Miles; 3rd Woodrow & Sons.
Six Geese, 4—1st, Woodrow & Sons; 2nd, Mrs. J. Miles; 3rd, Scanlon Bros.
Six Ducks, 5—1st and 2nd, Woodrow & Sons; 3rd, Jos. Tomalin.
One Dozen White Eggs, 5—1st, and 2nd, F. W. Krouse; 3rd, Jos. Tomalin.
One Dozen Brown Eggs, 8—1st, Moore Bros.; 2nd, F. W. Krouse; 3rd, F. & T. Parkin.
Six Squabs, 7—1st and 2nd, Chas H. Currier; 3rd, Wm. J. Hood.

POULTRY SPECIALS.

Light Brahmas—Best cock, H. W. Partlo; best cock and hen, H. W. Partlo; best cockerel and Pullet, H. W. Partlo; best collection, H. W. Partlo.

Dark Brahmas—Best cock or cockerel, L. C. Sage; best hen or pullet, L. C. Sage; best colored female, L. C. Sage; best collection, L. C. Sage.

Buff Cochins—Best cock or cockerel, Hugh Wyatt; best hen or pullet, Hugh Wyatt; best collection, Hugh Wyatt.

Partridge Cochins—Best cock or cockerel, C. H. Wilson; best hen or pullet, R. Oke; best collection, F. Wales.

Black Cochins—Best cock, hen, cockerel and pullet, C. A. R. Tilt; best collection, C. A. R. Tilt.

Black Langshans—Best cock or cockerel, R. McCurdy; best hen or pullet, C. A. R. Tilt; best trio, C. A. R. Tilt; best collection, C. A. R. Tilt.

A. O. C. Langshans—Best cock, hen, cockerel and pullet, L. Ridler.

Barred Plymouth Rocks—Best cock, I. K. Millard; second best cock, John Pringle; third best cock, John Pringle; fourth best cock, I. K. Millard; best two hens, I. K. Millard, best hen, I. K. Millard; second best hen, John Pringle; third best hen, I. K. Millard; fourth best hen, Chas. Hockin; best cockerel, I. K. Millard; second best cockerel, I. K. Millard; third best cockerel, John Pringle; fourth best cockerel, Chas. Hockin; best five cockerels, I. K. Millard; best pullet shown by an exhibitor who has not won a first prize at this exhibition in the last five years, Chas. Hockin; best pullet, John Pringle; second best pullet, Chas. Hockin; third best pullet, I. K. Millard; fourth best pullet, Geo. F. Holden; best male, I. K. Millard; best shaped male, I. K. Millard; best colored male, I. K. Millard; best shaped female, John Pringle; best colored female, I. K. Millard.

White Plymouth Rocks—Best cock, John L. Brown; best hen, C. J. Whitney; two whitest hens shown by one exhibitor, Wm. E. Hoggarth; best cockerel, Wm. E. Hoggarth; best pullet, Geo. A. Robertson; best four males, John L. Brown; best collection, Geo. A. Robertson.

Buff Plymouth Rocks—Best hen, John Bawden; best cock, hen, cockerel and pullet, John Bawden.

Buff Plymouth Rocks and Buff Orpingtons—Best colored cockerel, P. E. Aird; best shaped cockerel, J. M. Campbell.

Buff or White Plymouth Rocks—Best male, Wm. E. Hoggarth.

Golden Laced Wyandottes—Best cock or cockerel, John MacPherson; best cock having the neatest head and comb, Wm. Daniel; best pullet, J. H. McGill; best female, J. H. Magill.

Silver or Golden Wyandottes—Best Male, Wilbur Lemon.

Silver Laced Wyandottes—Best cock, Alfred Flawn; best hen, Hintonburg Poultry Yards; best cockerel, Wilbur Lemon; best Pullet, Hintonburg Poultry Yards, best bird, Hintonburg Poultry Yards; best cock, hen, cockerel and pullet, Hintonburg Poultry Yards.

Black Wyandottes—Best cock, G. and J. Bogue; best two cocks, Joe. R. Smith; best hen or pullet, Joe. R. Smith; best cockerel, Joe R. Smith; best pullet, Joe. R. Smith.

Buff Wyandottes—Best cock, Spry & Mick; best two cocks, Spry & Mick; best cockerel and pullet, Spry & Mick; best collection, Spry & Mick.

Silver Pencilled Wyandottes—Best cock or cockerel, Robert Patterson; best hen or pullet, Robert Patterson.

White Wyandottes—Best cock and hen, John S. Martin; best Cockerel and pullet, John S. Martin; best headed cockerel, John S. Martin; best cockerel shown by an exhibitor who has not won a prize at this exhibition since 1903, Wm. Archer; best cockerel showing best table quality, John S. Martin; Best individual bird, John S. Martin; best collection, John S. Martin; best cock, hen, cockerels and pullet, shown by a new exhibitor, Joseph Russell.

Partridge Wyandottes—Best cock or cockerel, F. T. Adams; best hen or pullet, J. E. Fidler; best shaped cockerel, F. T. Adams; pullet with best leg color, S. Rundle; pullet with best pencilling, F. T. Adams; best shaped pullet, Peter P. Becker; best collection, F. T. Adams.

Columbian Wyandottes—Best cock, T. H. Scott; best hen, W. Dawson; best two cocks and two hens, T. H. Scott; best cockerel, T. H. Scott; best shaped cockerel, W. Dawson; best pullet, Schelly Bros.; pullet with best hackle and tail, T. H. Scott; best three pullets, Schelly Bros.; best hackled pullet, T. H. Scott.

Dominiques—Best cock or cockerel, E. Syer; best hen or pullet, Geo. Burn; best collection, E. Syer.

Black Javas—Best cock and cockerel, R. Oke; best cock or cockerel, R. Oke; best hen and pullet, R. Oke; best hen or pullet, R. Oke.

Mottled Javas—Best cock or cockerel, G. and J. Bogue; best hen or pullet, G. and J. Bogue; best cock, hen, cockerel and pullet, G. and J. Bogue.

S. C. Rhode Island Reds—Best cock, Wm. J. Mihen; best cock or cockerel, Wm. J. Mihen; best cock and cockerel, E. Wankel & Son; best hen, Wm. J. Mihen; best hen or pullet, Wm. J. Mihen; best hen and pullet, Wm. J. Mihen; best cockerel, E. Wankel & Son; best cock, hen, cockerel and pullet, Wm. J. Mihen.

R. C. Rhode Island Reds—Best cock or cockerel, A. W. Graham; best hen, Emil Wankel; best hen or pullet, Emil Wankel; best cockerel, A. W. Graham; best two pullets, A. W. Graham.

Black Red Games—Best Pullet, J. W. Roberts; best collection, S. Stapleford.

Duckwing Games—Best cock, W. Barber; best collection, W. Barber.

Pyle Games—Best male, W. Barber; best female, J. W. Parkinson; best cock, hen, cockerel and pullet, J. W. Parkinson.

Indian Games, any variety—Best cock or cockerel, Finchamp & Topping; best hen or pullet, Finchamp & Topping; best pullet, Finchamp & Topping.

Cornish Indian—Best cock, Finchamp & Topping.

Black Sumatra Games—Best two cocks, Frank Shaw; best pullet, C. J. Daniels; best cock, hen, cockerel and pullet, Frank Shaw.

R. C. White Leghorns—Best cock or cockerel, M. R. Hoover; best hen or pullet, W. J. Bell; best cockerel, M. R. Hoover.

S. C. White Leghorns—Best cock,Wm. Ferguson; second best cock, Wm. Ferguson; best headed cock, Wm. Ferguson; best cock and cockerel, Wm. Ferguson; best hen or pullet, F. Wales; best cockerel, Wm. Ferguson; best pullet, F. Wales.

Black Leghorns—Best cock, A. E. Doan; best two cocks and two hens, A. E. Doan; best hen or pullet, A. E. Doan: best collection, A. E. Doan.

R. C. Brown Leghorns—Best cockerel, C. H. Wilson.

S. C. Brown Leghorns—Best cock or cockerel, W. A. Gurney; best hen, W. A. Gurney; best hen or pullet, W. A. Gurney; best cockerel, W. A. Gurney; best saddle striped cockerel shown by an exhibitor who has not won a prize at this exhibition since 1903, Peter Scott; Evenest colored cockerel, W. A. Gurney; best headed cockerel shown by an exhibitor who has not won a prize at this exhibition since 1903, Peter Scott.

Buff Leghorns—Best cock shown by an exhibitor who has not won a prize at this exhibition since 1903, Jas. Snetsinger; best hen, Nate. K. Cornwall; best two hens, Nate. K. Cornwall; best pullet, Nate K. Cornwall.

Spanish—Best collection, G. and J. Bogue.

S. C. Black Minorcas—Best cock, T. A. Faulds; best cockerel, T. A. Faulds; best pullet, T. A. Faulds; best cockerel and pullet, T. A. Faulds; best collection, T. A. Faulds.

R. C. Black Minorcas—Best cock, T. A. Faulds; best cock and cockerel, T. A. Faulds; best collection, T. A. Faulds.

White Minorcas—Best collection, A. C. Moyer.

S. C. White Minorcas—Best hen, A. C. Moyer.

Andalusians—Best cock, H. V. Cosh; best hen, H. V. Cosh; best cockerel, H. V. Cosh; best pullet, Chas. Gorvett; best cock, hen, cockerel and pullet, H. V. Cosh.

Silver Grey Dorkings—Best two cocks, Roswell Goldie; best hen, Jas. M. McCormack; best cockerel, Gordon A. Burns; best pullet, Gordon A. Burns; best male, Gordon A. Burns.

Colored Dorkings—Best male, Jas. M. McCormack; best female, G. and J. Bogue; best cock, hen, cockerel and pullet, Jas. M. McCormack.

White Dorkings—Best cock, Jas. M. McCormack; best hen or pullet, Geo. Burn.

Buff and Black Orpingtons—Winner of the largest number of prizes, H. A. Hoffman.

Buff Orpingtons—Best cock and cockerel, H. A. Hoffman; best cock or cockerel, P. E. Aird; best hen or pullet, Robert Barnes; best five cockerels, H. A. Hoffman; best cockerel or pullet, H. A. Hoffman; best pullet, A. W. E. Hellyer; best collection, A. W. E. Hellyer; best cockerel, H. A. Hoffman; best cock, hen, cockerel and pullet, A. W. E. Hellyer.

S. C. Buff Orpingtons—Best cock and pullet, A. W. E. Hellyer.

S. C. Black Orpingtons—Best cock owned by an exhibitor who has not won a prize at this exhibition since 1903, Harry T. Lush.

Black Orpingtons—Best three cocks, Kemp & Waterman; best headed cock, H. A. Hoffman; best hen, E. Fraleigh; best four hens, E. Fraleigh; best cockerel and pullet, Kemp & Waterman; best four pullets, Kemp & Waterman; best shaped pullet, Kemp & Waterman.

White Orpingtons—Best hen or pullet, Moore Bros.; best cockerel, Moore Bros.; best cock, hen, cockerel and pullet shown by an exhibitor who has not won a prize at this exhibition since 1903, Jas. Snetsinger.

Houdans—Best cock or cockerel, G. and J. Bogue; best hen or pullet, G. and J. Bogue; best cockerel or pullet shown by an exhibitor who has not won a prize at this exhibition since 1903, Geo. Elliott & Co.; best collection, G. and J. Bogue.

Creve-Coeurs—Best hen or pullet, G. and J. Bogue; best cockerel and pullet, G. and J. Bogue.

LaFleche—Best cockerel and pullet, G. and J. Bogue; best male, G. and J. Bogue; best cock, hen, cockerel and pullet, G. and J. Bogue.

W. C. B. Polands—Best cock, Wm. McNeil; best collection, Wm. McNeil.

Golden Polands—Best collection, Wm. McNeil.

Silver Poland—Best collection, Wm. McNeil.

White Polands—Best cock and hen, Wm. McNeil; best collection, Wm. McNeil.

Golden Bearded Polands—Best collection, Wm. McNeil.

Silver Bearded Polands—Best Collection, Wm. McNeil.

White Bearded Polands—Best collection, Wm. McNeil.

Buff Laced Polands—Best laced bird, Wm. McNeil; best collection, Wm. McNeil.

Polands—Best collection, Wm. McNeil.

G. S. Hamburgs—Best spangled breasted cock or cockerel, Jas. Baptie; best color of spangle on cock or cockerel, Richard Oke; best collection, Jas. Baptie.

S. S. Hamburgs—Best pullet, Harry T. Lush; best collection, Richard Oke.

G. P. Hamburgs—Best collection, Richard Oke.

S. P. Hamburgs—Best collection, Richard Oke.

Black Hamburgs—Best cock or cockerel, R. L. Wheadon; best hen or pullet, R. L. Wheadon; best collection, Richard Oke.

Hamburgs—Best collection, Richard Oke.

Red Caps—Best collection, G. W. Kinder; best pullet, Wells Bros.

Sultans—Best collection, Richard Oke.

Silkies—Best collection, E. Saunders.

A. O. V. Fowls—Best cock and hen, Peter P. Becker; best collection, Peter P. Becker.

Black Red Game Bantams—Best cock, W. R. Walker; best hen, W. R. Walker; best cockerel, W. R. Walker; best pullet, Chas R. Crowe; best cock, hen, cockerel and pullet, W. R. Walker.

Brown Red Game Bantams—Best cock, W. R. Walker; best hen, Thos. Sherlock; best cockerel, W. Barber; best pullet, W. Barber; best cock, hen, cockerel and pullet, W. Barber.

Duckwing Game Bantams—Best cock, W. Barber; best two hens, Spires Bros.; best cockerel, Spires Bros.; best pullet, Spires Bros.; best cock, hen, cockerel and pullet, Chas R. Crowe.

Pyle Game Bantams—Best cock, John Crowe; best hen, Tyson & McMaster; best cockerel, Thos. Bower; best pullet, W. Barber; best cock, hen, cockerel and pullet, Thos. Bower.

White Game Bantams—Best male, H. B. Donovan; best female, H. B. Donovan.

Birchen Game Bantams—Best cock, H. B. Donovan; best hen, W. Pearson; best cockerel, Rook Bros.; best pullet, Rook Bros.; best three pullets, W. Pearson.

Indian Game Bantams—Best collection, Doidge & McNeil.

Wheatan Game Bantams—Best female, Rook Bros.

Golden Sebright Bantams—Best cock and hen, Richard Oke; best hen, Richard Oke; best cockerel, T. J. Kiley; best pullet, Richard Oke; best collection, Richard Oke.

Silver Sebright Bantams—Best cock, Richard Oke; best two cocks, W. G. Murray; best hen, Richard Oke; best cockerel, Richard Oke; best pullet, Richard Oke; best collection, Richard Oke.

Black Rose Comb Bantams—Best cock, Richard Oke; best hen, W. G. Murray; best cockerel, Richard Oke; best pullet, R. L. Wheadon; best collection, R. L. Wheadon.

White Rose Comb Bantams—Best cock, W. G. Murray; best hen, Richard Oke; best cockerel, W. G. Murray; best pullet, Richard Oke; best collection, W. G. Murray.

White Cochin Bantams—Best three cocks, Doidge & McNeil; best collection, Doidge & McNeil.

Buff Cochin Bantams—Best cock, Richard Oke; best hen, Rosser Bros.; best cockerel, Rosser Bros.; best pullet, Rosser Bros.

Black Cochin Bantams—Best cock, C. A. R. Tilt; best hen, Rosser Bros.; best cockerel, H. Fraleigh; best pullet, W. J. Slessor; best collection, W. J. Slessor.

Partridge Cochin Bantams—Best cock, W. G. Murray; best hen, Wm. Cadman; best cockerel, Hugh Wyatt; best pullet, Hugh Wyatt; best collection, L. Austin Brill.

White Booted Bantams—Best collection, T. J. Kiley.

S. F. White Booted Bantams—Best cock, W. J. Teale; best hen, W. J. Teale; best cockerel, W. G. Murray; best pullet, T. J. Kiley.

Japanese Black tailed Bantams—Best cock and hen, Richard Oke; best collection, W. G. Murray.

Japanese White Bantams—Best collection, Richard Oke.

Japanese Black Bantams—Best collection, Richard Oke.

A. O. V. Japanese Bantams—Best cock and hen , W. G. Murray; best collection, W. G. Murray.

Polish Bearded Bantams—Best cock or cockerel, T. J. Kiley; best two hens, T. J. Kiley; best collection, T. J. Kiley.

Polish Unbearded Bantams—Best collection, H. B. Donovan.

Brahma Bantams—Best collection, H. W. Partlo.

Ornamental Bantams—Largest Entry, W. G. Murray.

Bronze Turkeys—Best male, W. J. Bell; best female, W. J. Bell; best collection, W. J. Bell.

White Turkeys—Best male, Baker Bros; best female, Baker Bros.; best collection, Baker Bros.

A. O. V. Turkeys—Best Male, A. G. H. Luxton.

Toulouse Geese—Best old male,Geo. Burn; best young male, D. Douglas & Son; best female, D. Douglas & Son; best collection, D. Douglas & Son.

Embden Geese—Best pair, C. A. R. Tilt; best bird, C. A. R. Tilt; best collection, C. A. R. Tilt.

African Geese—Best two old pairs, C. A. R. Tilt.

English Dun Geese—Best Collection, A. G. H. Luxton.

Aylesbury Ducks—Best bird, G. and J. Bogue; best collection, G. and J. Bogue.

Rouen Ducks—Best male. Baker Bros.; best collection, G. & J. Bogue.

Pekin Ducks—Best bird, C. A. R. Tilt; best two pairs, C. A. R. Tilt; best collection, C. A. R. Tilt.

Indian Runner Ducks—Best young pair, S. D. Furminger; best collection, S. D. Furminger.

Cayuga Ducks—Best collection, Isaac T. Knight & Co.

Muscovy Ducks—Best collection, Isaac T. Knight & Co.

Wild Ducks—Best collection, H. Karn.

PIGEON SPECIALS.

Best Pair Silver Dun Antwerps—W. H. Reid.

Best Adult Dragoon Cock—W. Steer.

Best Adult Dragoon Hen—W. Steer.

Best Dragoon in Show—W. Steer.

Best Owl Chinese A. O. V. Hen—W. H. Reid.

Best German Frill Back—A. and T. Readwin.

Best Maltese Pigeon—J. and T. Hatton.

Best Russian Trumpeter Cock—L. Ridler.

Best Russian Trumpeter Hen—W. H. Reid.

MISCELLANEOUS SPECIALS.

Best Collection, Cavies and Belgian Hares—Wm. Fox.

Best Collection, Scotch Fancy Canaries—F. W. Hodgkin.

Best Collection, A. O. V. Canaries—F. W. Hodgkin.

Best Male, Utility Fowl—Scanlon Bros.

Best Pen of Utility Fowls—Geo. A. Robertson.

Best Chicken, Dressed Poultry—J. E. Mounce.

Best Six Chickens of any variety, Dressed Poultry—J. E. Mounce.

Best Exhibit of Chickens, Dressed Poultry—J. E. Mounce.

Best Pair of Chickens shown by a lady Exhibitor—Mrs. W. Card.

Six Heaviest Bronze Turkeys—Woodrow & Sons.

Best Four Birds, Cock, Hen, Cockerel and pullet in Barred Plymouth Rocks, Light Brahmas, or Single Comb Brown Leghorns—H. W. Partlo.

Best Cock, Hen, Cockerel and Pullet in the Show—Wm. McNeil.

Best Exhibit in any one variety of Fowls—J. S. Martin.

EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW.

HELD AT OTTAWA, ONT., JANUARY, 18TH TO 22ND, 1909.

LIST OF PRIZE WINNERS.

HORSES.

Clydesdale Stallions, Foaled Previous to January 1st, 1905.

1st—President Roosevelt, (imp.) [7759] (13651), foaled May 1st, 1902. Exhibited by Smith & Richardson, Columbus, Ont.

2nd—Duke of Malton, (imp.) [7768] (12947), foaled 1903. Exhibited by Smith & Richardson, Columbus, Ont.

3rd—Cecil (imp.) [3352], foaled, 1900. Exhibited by R. Reid & Co., Ottawa.

4th—Baron's Treasure (imp.) [7233], foaled July 12th, 1901. Exhibited by Wm. Meharey, Russell, Ont.

5th—Adam Bede (imp.) [4783] (11992), foaled May, 1902. Exhibited by J. J. Black & Son, Winchester, Ont.

6th—Lundie (imp.) [5981] (13081). Exhibited by Wm. Hodgins, Portage du Fort, Que.

7th—Sir Henry (imp.) [6104] (13200), foaled 1904. Exhibited by Smith & Richardson, Columbus, Ont.

8th—The Percy (imp.) [8206], foaled April 7th, 1904. Exhibited by Wm. Meharey, Russell, Ont.

9th—Acrobat (imp.) [7971] (11242), foaled June 18th, 1904. Exhibited by Robert Ness & Son, Howick, Que.

Clydesdale Stallions, Foaled in 1905.

1st—Black Ivory (imp.) [7761] (13367), foaled April 19th, 1905. Exhibited by Smith & Richardson, Columbus, Ont.

2nd—Baron Elrig (imp.) [8506] (13324), foaled June 9th, 1905. Exhibited by C. W. Barber, Gatineau Point, Que.

3rd—Inheritor (imp.) [7765] (13855), foaled 1905. Exhibited by Smith & Richardson, Columbus, Ont.

4th—Fusilier (imp.) (13482), foaled May 14th, 1905. Exhibited by Robert Ness & Son, Howick, Que.

Clydesdale Stallions, Foaled in 1906.

1st—Dunure Pebble [8461], foaled 1906. Exhibited by Smith & Richardson, Columbus, Ont

2nd—Prince Ascot [8458], foaled 1906. Exhibited by Smith & Richardson, Columbus, Ont.

3rd—Royal Hall (imp.) [8504] (14492), foaled July 3rd, 1906. Exhibited by C. W. Barger, Gatineau Point, Que.

4th—Dunure Acknowledgment (imp.) [8457] (14486), foaled 1906. Exhibited by Smith & Richardson, Columbus, Ont.

5th—Ascog Pride (imp.) [8505] (13962), foaled June 1st, 1906. Exhibited by C. W. Barber, Gatineau Point, Que.

6th—Lord Kintore (imp.) [8451] (14243), foaled April 17th, 1906. Exhibited by T. Burke, South March, Ont.

Clydesdale Stallions, Foaled in 1907.

1st—Dunure Wallace [8455] (14488), foaled 1907. Exhibited by Smith & Richardson, Columbus, Ont.

2nd—Indomitable (imp.) [8414] (14465), foaled July, 1907. Exhibited by Robert Ness & Son, Howick, Que.

Canadian-Bred Clydesdale and Shire Stallions, Foaled Previous to January 1st, 1907.

1st—Kayama [8029], foaled June 2nd, 1906. Exhibited by Robert Hunter & Sons, Maxville, Ont.

2nd—Stanley Prince 2nd [4325], foaled August 2nd, 1902. Exhibited by D. G. Boyd, Kars, Ont.

3rd—Whitrigg [8218], foaled 1906. Exhibited by W. T. Hodgins, Hazeldean, Ont.

4th—Gladden's Pride [7922], foaled May, 1905. Exhibited by J. J. Black & Son, Winchester, Ont.

Canadian-Bred Clydesdale or Shire Stallions, Foaled on or after January 1st, 1907.

1st—Hurlford (16549), foaled June 3rd, 1907. Exhibited by Smith & Richardson, Columbus, Ont.

2nd—Prince of Huntley [7741], foaled May 20th, 1907. Exhibited by Geo. A. Hodgins, Carp.

Canadian-Bred Clydesdale or Shire Mares, Foaled Previous to January 1st, 1906.

1st—Princess May. Exhibited by Wm. Hodgins, Portage du Fort, Que.

2nd—Hattie McIntosh [7737], foaled April 17th, 1905. Exhibited by Nixon Scharf, Cummings' Bridge, Ont.

3rd—Lady Avondale [10641], foaled July 16th, 1905. Exhibited by Isaac L. Wilson, McGarry, Ont.

Canadian-Bred Clydesdale and Shire Mares, Foaled in 1906.

1st—Lady Glenlivet [14333], foaled July 20th, 1906. Exhibited by Smith & Richardson, Columbus, Ont.

2nd—Her Pretty MacQueen [9631], foaled April 8th, 1906. Exhibited by J. R. McCurdy, Hazeldean, Ont.

Shire Stallions, Any Age.

1st—Coleshill's Royal Albert (imp.) [383], (20367), foaled 1901. Exhibited by Wm. Hodgins, Portage du Fort, Que.

2nd—Royal Fortune [550]. Exhibited by Wm. Hodgins, Portage du Fort, Que.

Hackney Stallions, Foaled Previous to January 1st, 1906.

1st—Rillington Grandee—268—(7581), foaled 1898. Exhibited by J. J. Black & Son, Winchester, Ont.

2nd—Rydale Revival—174—(7976), foaled 1900. Exhibited by R. Ness & Son, Howick, Que.

Standard-Bred Stallions, Any Age.

1st— Pilot Chimes, 36937, foaled 1899. Exhibited by R. W. Stewart, 1016 Bank Street, Ottawa, Ont.

2nd—Prince Ambrose, 63984, foaled 1902. Exhibited by A. H. Skuce, Carsonby, Ont.

3rd—Deveras, 36229, foaled 1894. Exhibited by J. J. Black & Son, Winchester, Ont.

Thoroughbred Stallions, Any Age.

1st—Kirkfield, 39433, foaled 1904. Exhibited by Ottawa Hunt Club, Ottawa, Ont.

2nd—Javelin, 48093, foaled 1905. Exhibited by Ottawa Hunt Club, Ottawa, Ont.

Horses Suitable for Hunters, Geldings or Mares, Any Age.

1st—Dunbeith, foaled 1900. Exhibited by Dr. R. E. Webster, Ottawa, Ont.

2nd—Woodlark, foaled 1903. Exhibited by Dr. R. E. Webster, Ottawa, Ont.

3rd—Skylark, foaled 1901. Exhibited by Dr. R. E. Webster, Ottawa, Ont.

4th—Wyoming. Exhibited by J. B. Duford Ottawa, Ont.

5th—Rex, foaled 1901. Exhibited by His Excellency, Earl Grey, Ottawa, Ont.

Heavy Draught Geldings or Mares, Shown in Single Harness, Three Years Old and Over.

1st—Sally Lloyd (11209). Exhibited by J. J. Black & Son, Winchester, Ont.

2nd—Elora, foaled 1902. Exhibited by W. T. Hodgins, Hazeldean, Ont.

3rd—Lady Marie (11115). Exhibited by J. J. Black & Son, Winchester, Ont.

4th—Charlie, foaled 1903. Exhibited by A. M. Stewart, Dalmeny, Ont.

Heavy Draught Team, in Harness, Geldings or Mares.

1st—Adam Scharf, Cummings' Bridge, Ont.

2nd—The Geo. Matthews Co., Ltd., Hull, Que

3rd—J. H. Fee, Manotick, Ont.

4th—W. Gilchrist, Kinburn, Ont.

CHAMPIONSHIPS.

Clydesdale stallion, any age, Smith & Richardson, Columbus, Ont.

Canadian-Bred Clydesdale or Shire stallion, any age, Robert Hunter & Sons, Maxville, Ont.

Clydesdale or Shire mare, any age, Smith & Richardson, Columbus.

Hackney stallion, any age, J. J. Black & Son, Winchester, Ont.

BEEF CATTLE.

SHORTHORNS.

Steer, 2 years and under 3.

1st, R. Reid & Co., Ottawa; 2nd, Jos. W. Barnett, Brooklin; 3rd, A. A. Armstrong, Fergus.

Steer, 1 year and under 2.

1st, Peter White, Pembroke; 2nd and 5th, Wm. Ormiston & Sons, Columbus; 3rd and 4th, A. A. Armstrong, Fergus.

Steer, under 1 year.

1st, Jas. Leask, Greenbank; 2nd and 3rd, W. C. Edwards & Co., Rockland; 4th, L. Parkinson, Eramosa; 5th, Jos. W. Barnett, Brooklin.

Heifer, 2 years and under 3.

1st, W. C. Edwards & Co., Rockland; 2nd, Peter White, Pembroke; 3rd, Jas. Leask, Greenbank.

Heifer, 1 year and under 2.

1st and 3rd, W. C. Edwards & Co., Rockland; 2nd and 4th, Peter White, Pembroke; 5th, Wm. A. Wallace, Kars.

Heifer, under 1 year.

1st and 3rd, W. C. Edwards & Co., Rockland; 2nd, Jas. Leask, Greenbank; 4th, Peter White, Pembroke; 5th, Wm. A. Wallace, Kars.

GALLOWAYS OR DEVONS.

Steer or Heifer, 2 years and under 3.

1st and 2nd, D. McCrae, Guelph.

Steer or Heifer, 1 year and under 2.

1st and 2nd, D. McCrae, Guelph.

Steer or Heifer, under 1 year.

1st and 2nd, D. McCrae, Guelph.

Cow or Heifer, 3 years or over.

1st, D. McCrae, Guelph.

GRADES OR CROSSES.

Steer, 2 years and under 3.

1st, B. Slattery, Ottawa; 2nd, Wm. Ormiston & Sons, Columbus; 3rd and 5th, A. A. Armstrong, Fergus; 4th, Jas. Leask, Greenbank.

Steer, 1 year and under 2.

1st, B. Slattery, Ottawa; 2nd and 4th, A. A. Armstrong, Fergus; 3rd, Alex. Dynes, Ottawa; 5th, Jas. Leask, Greenbank.

Steer, under 1 year.

1st, Jas. Leask, Greenbank; 2nd and 3rd, Jos. W. Barnett, Brooklin; 4th, R. Reid & Co., Ottawa; 5th, Wm. A. Wallace, Kars.

Heifer, 2 years and under 3.

1st and 5th, Jas. Leask, Greenbank; 2nd and 3rd, A. A. Armstrong, Fergus; 4th, R. Reid & Co., Ottawa.

Heifer, 1 year and under 2.

1st and 2nd, Jas. Leask, Greenbank; 3rd and 4th, A. A. Armstrong, Fergus; 5th, R. Reid & Co., Ottawa.

Heifer, under 1 year.

1st, 3rd, and 5th, Jas. Leask, Greenbank; 2nd, L. Parkinson, Eramosa; 4th, Wm. A. Wallace, Kars.

DRESSED CARCASSES.

Pure-Bred or Grade.

1st, 4th and 5th, A. A. Armstrong, Fergus; 2nd and 3rd, Alex. Dynes, Ottawa; 6th, W. C. Edwards & Co., Rockland.

EXPORT STEERS.

Three Export Steers.

1st, A. A. Armstrong, Fergus; 2nd, 3rd, and 5th, Alex. Dynes, Ottawa; 4th, Wm. Ormiston & Sons, Columbus; 6th, R. Reid & Co., Ottawa.

Special, Grade Steer Sired by a Pure-Bred Shorthorn Bull.

1st and 2nd, B. Slattery, Ottawa; 3rd, Jas. Leask, Greenbank.

Special, Best Beef Steer Any Age, Exhibited by a Resident of the Townships of Nepean or Gloucester.

B. Slattery, Ottawa.

SHEEP.

COTSWOLDS.

Wether, under 1 year.

1st, J. W. Lee & Sons, Simcoe; 2nd, 3rd and 4th, John Sockett, Rockwood.

Three Wethers under 1 year.

1st, John Sockett, Rockwood.

Ewe, under 1 year.

1st, 2nd and 3rd, John Sockett, Rockwood.

Three Ewes, under 1 year.

1st, John Sockett, Rockwood.

Dressed Carcass Wether under 1 year.

1st, J. W. Lee & Sons, Simcoe; 2nd and 3rd, John Sockett, Rockwood.

LINCOLNS.

Wether, under 1 year.

1st, 2nd and 3rd, L. Parkinson, Eramosa.

Three Wethers, under 1 year.

1st and 2nd, L. Parkinson, Eramosa.

Ewe, under 1 year.

1st, 2nd and 3rd, L. Parkinson, Eramosa.

Three Ewes, under 1 year.

1st and 2nd, L. Parkinson, Eramosa.

Dressed Carcass Wether, under 1 year.

1st and 2nd, L. Parkinson.

LEICESTERS.

Ewe, under 1 year.

1st and 2nd, G. & W. Parkinson, Eramosa.

Three Ewes, under 1 year.

1st, G. & W. Parkinson, Eramosa.

OXFORDS.

Wether, under 1 year.

1st, 2nd and 3rd, J. W. Lee & Sons, Simcoe.

Three Wethers under 1 year.

1st, J. W. Lee & Sons, Simcoe.

Ewe, under 1 year.

1st, 2nd and 3rd, J. W. Lee & Sons, Simcoe.

Three Ewes under 1 year.

1st, J. W. Lee & Sons, Simcoe.

Dressed Carcass Wether under 1 year.

1st, J. W. Lee & Sons, Simcoe.

SHROPSHIRES.

Wether, under 1 year.

1st, 2nd and 3rd, J. & D. J. Campbell, Woodville; 4th, 5th and 6th, A. M. Stewart & Sons, Dalmeny.

Three Wethers, under 1 year.

1st, J. & D. J. Campbell; 2nd, A. M. Stewart & Sons, Dalmeny.

Ewe, under 1 year.

1st, 2nd and 3rd, J. & D. J. Campbell, Woodville; 4th, Wm. A. Wallace, Kars; 5th, A. M. Stewart & Sons, Dalmeny.

Three Ewes, under 1 year.

1st, J. & D. J. Campbell, Woodville; 2nd, Wm. A. Wallace, Kars; 3rd, A. M. Stewart & Sons, Dalmeny.

Dressed Carcass Wether under 1 year.

1st, J. & D. J. Campbell, Woodville; 2nd and 3rd, A. M. Stewart & Sons, Dalmeny.

SOUTHDOWNS.

Wether, under 1 year.

1st, 2nd and 3rd, Telfer Bros., Paris.

Three Wethers, under 1 year.

1st, Telfer Bros., Paris; 2nd, Geo. Baker, Simcoe.

Ewe, under 1 year.

1st and 3rd, Telfer Bros., Paris; 2nd, 4th and 5th, Geo. Baker, Simcoe.

Three Ewes, under 1 year.

1st, Telfer Bros., Paris; 2nd, Geo. Baker, Simcoe.

Dressed Carcass Wether under 1 year.

1st and 3rd, Geo. Baker, Simcoe; 2nd, Telfer Bros., Paris.

DORSETS.

Wether, under 1 year.

1st, 2nd and 3rd, R. H. Harding, Thorndale.

Three Wethers, under 1 year.

1st, R. H. Harding, Thorndale.

Ewe, under 1 year.

1st, 2nd and 3rd, R. H. Harding, Thorndale.

Three Ewes, under 1 year.

1st, R. H. Harding, Thorndale.

Dressed Carcass Wether under 1 year.

1st, R. H. Harding, Thorndale.

HAMPSHIRES AND SUFFOLKS.

Wether, under 1 year.

1st, Telfer Bros., Paris.

Ewe, under 1 year.

1st, 2nd and 3rd, Telfer Bros., Paris.

Three Ewes, under 1 year.

1st, Telfer Bros., Paris.

Dressed Carcass Wether under 1 year.

1st, Telfer Bros., Paris.

GRADES OR CROSSES.

Wether, under 1 year.

1st, J. & D. J. Campbell, Woodville; 2nd, L. Parkinson, Eramosa; 3rd, J. W. Lee & Sons, Simcoe.

Three Wethers, under 1 year.

1st, J. & D. J. Campbell, Woodville; 2nd, J. W. Lee & Sons, Simcoe; 3rd, L. Parkinson, Eramosa.

Ewe, under 1 year.

1st and 2nd, Geo. Baker, Simcoe; 3rd and 4th, J. & D. J. Campbell, Woodville.

Three Ewes, under 1 year.

1st, Geo. Baker, Simcoe; 2nd, J. & D. J. Campbell, Woodville; 3rd, L. Parkinson, Eramosa; 4th, J. A. Heron, Billing's Bridge.

Dressed Carcass Wether under 1 year.

1st, 2nd and 3rd, J. R. McCurdy, Hazeldean; 4th, Alex. Dynes, Ottawa.

SWINE.

YORKSHIRES.

Barrow, 6 months and under 9.

1st, 2nd and 3rd, Jos. Featherston & Son, Streetsville; 4th, Alex. Dynes, Ottawa; 5th, A. H. Foster, Twin Elm; 6th, P. O. Collins, Bowesville.

Barrow, under 6 months.

1st and 3rd, P. O. Collins, Bowesville; 2nd and 5th, Jos. Featherston & Son, Streetsville; 4th, Alex. Dynes, Ottawa.

Sow, 6 months and under 9.

1st and 2nd, Jos. Featherston & Son, Streetsville; 3rd, P. O. Collins, Bowesville; 4th and 6th, Alex. Dynes, Ottawa; 5th, A. H. Foster, Twin Elm.

Sow, under 6 months.

1st and 3rd, P. O. Collins, Bowesville; 2nd and 5th, Jos. Featherston & Son, Streetsville; 4th, Alex. Dynes, Ottawa.

BERKSHIRES.

Barrow, 6 months and under 9.

1st, Wm. A. Wallace, Kars.

Sow, 6 months and under 9.

1st and 4th, Wm. A. Wallace, Kars; 2nd and 3rd, Alex. Dynes, Ottawa.

Sow, under 6 months.

1st and 2nd, Wm. A. Wallace, Kars.

TAMWORTHS.

Barrow, 6 months and under 9.

1st and 2nd, R. Reid & Co., Ottawa; 3rd, Alex. Dynes, Ottawa.

Barrow, under 6 months.

1st and 3rd, R. Reid & Co., Ottawa; 2nd, Alex. Dynes, Ottawa.

Sow, 6 months and under 9.

1st and 4th, Alex. Dynes, Ottawa; 2nd and 3rd, R. Reid & Co., Ottawa.

Sow, under 6 months.

1st and 4th, Alex. Dynes, Ottawa; 2nd and 3rd, R. Reid & Co., Ottawa.

GRADE OR CROSS.

Barrow, 6 months and under 9.

1st and 2nd, Jos. Featherston & Son, Streetsville.

Barrow, under 6 months.

1st and 2nd, Jos. Featherston & Son, Streetsville; 3rd, Samuel Bray, Enfield; 4th and 5th, Alex. Dynes, Ottawa.

Sow, 6 months and under 9.

1st and 2nd, Jos. Featherston & Son, Streetsville; 3rd, Alex. Dynes, Ottawa.

Sow, under 6 months.

1st, R. Reid & Co., Ottawa; 2nd and 5th, Alex. Dynes, Ottawa; 3rd, Jos. Featherston & Son,, Streetsville; 4th, Samuel Bray, Enfield.

EXPORT BACON HOGS.

Three Pure-Breds.

1st, P. O. Collins, Bowesville; 2nd, 3rd, and 4th, Jos. Featherston & Son, Streetsville; 5th, Alex. Dynes, Ottawa; 6th, R. Reid & Co., Ottawa; 7th, A. H. Foster, Twin Elm.

Three Grades or Crosses.

1st and 2nd, Jos. Featherston & Son, Streetsville; 3rd and 5th, Alex. Dynes, Ottawa; 4th, Samuel Bray, Enfield .

Three best export bacon hogs.

1st, P. O. Collins, Bowesville; 2nd, Jos. Featherston & Son, Streetsville.

DRESSED CARCASSES.

Three Pure-Breds.

1st, 3rd and 6th, Jos. Featherston & Sons, Streetsville; 2nd, A. H. Foster, Twin Elm; 4th and 5th, Alex. Dynes, Ottawa; 7th, P. O. Collins, Bowesville; 8th, R. Reid & Co., Ottawa.

Three Grades.

1st and 2nd, Jos. Featherston & Son, Streetsville; 3rd and 4th, Alex. Dynes, Ottawa; 5th, Samuel Bray, Enfield.

Three Best Dressed Carcasses of Bacon Hogs.

1st, Jos. Featherston & Son, Streetsville; 2nd, A. H. Foster, Twin Elm.

DAIRY TEST.

Name of Cow and Owner.	Lbs. of milk.	Per cent. fat.	Lbs. fat.	Lbs. solids not fat.	Points for days in milk.	Points for fat.	Points for solids, not fat.	Total points.
Class 25, Sec. 1,—Shorthorn Cow, 42 months and over—								
1st, Morning Glory 5th, Samuel Bray, Enfield	136.2	3.46	4.72	11.22	1.1	94.40	44.88	140.38
2nd, Carleton Beauty, J. J. Hodgins, Hazeldean	100.1	3.76	3.77	8.47	....	75.40	33.80	109.20
3rd, Blossom, R. Reid & Co., Ottawa	95.5	3.83	3.66	8.24	....	73.20	32.96	106.16
4th, Pansy 4th, R. Reid & Co., Ottawa	76.6	4.08	3.13	6.32	....	62.60	25.28	87.88
Class 26, Sec. 1,—Ayrshire Cow, 42 months and over—								
1st, Jean Armour, Geo. Rice, Tilsonburg	186.3	3.9	7.28	14.51	.3	153.60	56.56	210.46
2nd, White Floss, H. & J. McKee, Norwich	143.7	4.2	5.98	11.07	1.4	119.60	44.28	165.28
3rd, Sarah 2nd, H. & J. McKee, Norwich	155.8	3.49	5.44	12.33	6.7	108.80	49.32	164.82
4th, Maggie Brown of H. H., N. Dyment. Clappison	146.6	3.74	5.49	11.56	.9	109.80	46.24	156.94
5th, Spottie, H. & J. McKee, Norwich	137.3	3.85	5.29	11.	1.4	105.80	44.	151.20
6th, Rosalee of H. H., N. Dyment, Clappison	136.4	3.6	4.91	10.70	2.5	98.20	42.80	143.50
Class 26, Sec. 2,—Ayrshire Heifer, under 42 months—								
1st, Forget-Me-Not of H. H., N. Dyment, Clappison	106.	4.1	4.41	8.74	.7	88.20	34.96	123.86
2nd, Star's Sarah, H. & J. McKee, Norwich	98.1	3.86	3.79	8.	8.	75.80	32.	115.80
Class 27, Sec 1,—Holstein Cow, 42 months and over—								
1st, Francy 3rd, J. H. Caldwell, Fallowfield	212.1	3.7	7.83	14.42	....	156.60	57.68	214.28
2nd, Idaline Pauline DeKol, Geo. Rice, Tilsonburg	216.8	3.25	7.07	16.13	1.5	141.40	64.52	207.42
3rd, Maudie DeKol, T. A. Spratt, Billing's Bridge	227.3	3.1	7.05	16.50	....	141.	66.00	207.
4th, Hasketon Belle 4th, J. H. Caldwell, Fallowfield	181.7	3.1	5.80	12.97	1.2	116.	51.88	169.08
5th, Bouncing Jess 4th, Martin McDowell, Norwich	135.8	3.9	5.32	10.23	....	106.40	40.92	147.32
Class 27, Sec. 2,—Holstein Heifer, under 42 months—								
1st, Queen's Butler Girl, Geo. Rice, Tilsonburg	150.7	3.12	4.71	10.33	....	94.20	41.32	135.52
2nd, Lady Calanthus DeKol, Martin McDowell, Norwich	118.	3.7	4.05	8.88	7.4	81.	35.52	123.92
Class 29, Sec. 1,—Grade Cow, 42 months and over								
1st, Jane, T. A. Spratt, Billing's Bridge	187.	3.09	5.79	14.87	....	115.80	59.48	175.28
2nd, Rosalee, R. A. Heron, Billing's Bridge	169.7	3.53	5.99	12.20	....	119.80	48.80	168.60
3rd, Granny, Martin McDowell, Norwich	151.8	3.32	5.04	9.87	....	108.	39.48	147.48
4th, Rose of Robin Hill, Wm. Ormiston & Sons, Columbus	121.2	3.8	4.63	9.66	....	92.60	38.64	131.24
Class 29, Sec. 2,—Grade Heifer, under 42 months—								
1st, Dina, Martin McDowell, Norwich	122.2	2.98	3.65	8.94	....	73.	35.76	108.76
2nd, Tiny, R. A. Heron, Billing's Bridge	113.1	2.73	3.10	8.76	....	62.	35.04	97.04
3rd, Molly, R. Reid & Co., Ottawa	76.5	3.7	2.86	6.10	....	57.20	24.40	81.60

SEEDS.

FALL WHEAT.

1st, Andrew Schmidt, Mildmay.
2nd, C. R. Gies, Heidelberg.
3rd, T. Baker & Son, Solina.
4th, A. H. Foster, Twin Elm.

SPRING WHEAT.

1st, S. A. Northcott, Taunton.
2nd, J. A. Heron, Billing's Bridge.

BANNER OATS.

1st, Jas. Snetsinger, Eamer's Corners.
2nd, Geo. Boyce, Merivale.
3rd, Wm. Shields, Eamer's Corners.

OATS, ANY OTHER VARIETY WHITE.

1st, Andrew Schmidt, Mildmay.
2nd, Jas. Snetsinger, Eamer's Corners.
3rd, Wm Shields, Eamer's Corners.
4th, S. J. Woods, Metcalfe.

BARLEY, SIX-ROWED.

1st, S. A. Northcott, Taunton.
2nd, A. H. Foster, Twin Elm.
3rd, Geo. R. Bradley, Carsonby.
4th, Jas. Snetsinger, Eamer's Corners.

SMALL FIELD PEAS.

1st, Jas. Snetsinger, Eamer's Corners.
2nd, S. A. Northcott, Taunton.

POTATOES, ROSE TYPE.

1st, Jas. Snetsinger, Eamer's Corners.
2nd, Geo. R. Bradley, Carsonby.
3rd, Wm. Shields, Eamer's Corners.

POTATOES, BEST EARLY VARIETY OTHER THAN ROSE TYPE.

1st, Jas. Snetsinger, Eamer's Corners.
2nd, S. J. Woods, Metcalfe.
3rd, Geo. R. Bradley, Carsonby.

POTATOES, WHITE.

1st, A. H. Foster, Twin Elm.
2nd, Wm. Shields, Eamer's Corners.
3rd, Jas. Snetsinger, Eamer's Corners.
4th, Geo. R. Bradley, Carsonby.

INDIAN CORN, BEST FOR ENSILAGE FOR OTTAWA VALLEY.

1st, J. H. Williams, Fletcher.
2nd, J. A. Fletcher, Valetta.
3rd, Robert Fletcher, Valetta.
4th, Geo. Baker, Simcoe.

TIMOTHY SEED.

1st, Jas. Snetsinger, Eamer's Corners.
2nd, Wm. Shields, Eamer's Corners.
3rd, J. A. Northcott, Taunton.
4th, A. H. Foster, Twin Elm.

POULTRY.

List gives number of entries and awards in each section. For Post Office address of exhibitors, see page 288.

LIGHT BRAHMAS.

Cocks, 4—1st, 2nd and 3rd, H. W. Partlo.
Hens, 6—1st, 2nd and 3rd, H. W. Partlo.
Cockerels, 4—1st, 2nd and 3rd, H. W. Partlo.
Pulets, 4—1st, 2nd, and 3rd, H. W. Partlo.

DARK BRAHMAS.

Cocks, 2—1st, McIntosh & Halliday; 2nd, Jas. Snetsinger.
Hens, 2—1st, Jas. Snetsinger; 2nd, McIntosh & Halliday.
Cockerels, 2—1st, Chas. LaRose; 2nd, Jas. Snetsinger.
Pullets, 2—1st, Chas. LaRose; 2nd, Jas. Snetsinger.

BUFF COCHINS.

Cocks, 4—1st, Hugh Wyatt; 2nd, Chas. LaRose; 3rd, Tooker & Bowey.
Hens, 8—1st, 2nd, and 3rd, Hugh Wyatt.
Cockerels, 5—1st, 2nd, and 3rd, Hugh Wyatt.
Pullets, 7—1st, 2nd and 3rd, Hugh Wyatt.

PARTRIDGE COCHINS.

Cocks, 5—1st, R. Oke; 2nd, C. H. Wilson; 3rd, F. Wales.
Hens, 6—1st, R. Oke; 2nd and 3rd, F. Wales.
Cockerels, 5—1st, R. Oke; 2nd and 3rd, F. Wales.
Pullets, 6—1st, R. Oke; 2nd and 3rd, F. Wales.

BLACK COCHINS.

Cocks, 1—1st, Chas. LaRose.
Hens 5—1st, W. H. Reid; 2nd, H. R. K. Tozer; 3rd, Tooker & Bowey.
Pullets, 2—1st, W. H. Reid; 2nd, H. R. K. Tozer.

WHITE COCHINS.

Hens, 2—1st, Tooker & Bowey; 2nd, McIntosh & Halliday.
Cockerels, 2—1st, Tooker & Bowey.
Pullets, 2—1st and 2nd, Tooker & Bowey.

LANGSHANS.

Cocks, 1—1st, McIntosh & Halliday.
Hens, 2—1st, W. H. Reid; 2nd, Jas. Snetsinger.
Cockerels, 3—1st, F. Wales; 2nd, McIntosh & Halliday; 3rd, Jas. Snetsinger.
Pullets, 2—1st, F. Wales; 2nd, McIntosh & Halliday.

BARRED PLYMOUTH ROCKS.

Cocks, 20—1st, John Pringle; 2nd, A. P. Hillhouse; 3rd, J. E. Fidler; 4th, John A. Lambertus; 5th, Jean Rolland.

Hens, 26—1st and 3rd, F. A. James; 2nd, F. H. Westbury; 4th, Jos. Fortier; 5th, Dr. G. W. Alexander.

Cockerels, 35—1st, John A. Lambertus; 2nd and 3rd, John Pringle; 4th, F. H. Westbury; 5th, J. E. Fidler.

Pullets, 34—1st and 4th, John Pringle; 2nd, E. L. Goodall; 3rd and 5th, J. E. Fidler.

WHITE PLYMOUTH ROCKS.

Cocks, 4—1st, Wm. Craig; 2nd, Geo. Robertson; 3rd, Jos. Fortier.
Hens, 5—1st, Geo. Robertson; 2nd, H. R. K. Tozer; 3rd, Jos. Fortier.
Cockerels, 5—1st, Wm. Craig; 2nd, Jos. Fortier; 3rd, Geo. Robertson.
Pullets, 7—1st and 3rd, Geo. Robertson; 2nd, Jas. Snetsinger.

BUFF PLYMOUTH ROCKS.

Cocks, 3—1st and 2nd, Hintonburg Poultry Yards; 3rd, Geo. Robertson.

Hens, 5—1st, Hintonburg Poultry Yards; 2nd, Geo. Robertson; 3rd, Jas. Snetsinger.

Cockerels, 9—1st and 2nd, Hintonburg Poultry Yards; 3rd, Geo. Robertson.

Pullets, 10—1st and 2nd, Hintonburg Poultry Yards; 3rd, Geo. Robertson.

GOLDEN WYANDOTTES.

Cocks, 3—1st and 2nd, J. H. Magill; 3rd, G. Higman, Sr.

Hens, 5—1st and 2nd, J. H. Magill; 3rd, Hintonburg Poultry yards.

Cockerels, 4—1st and 2nd, J. H. Magill; 3rd, Hintonburg Poultry Yards.

Pullets, 6—1st, J. H. Magill; 2nd, G. Higman, Sr.; 3rd, Hintonburg Poultry Yards.

SILVER WYANDOTTES.

Cocks, 3—1st, 2nd, and 3rd, Hintonburg Poultry Yards.
Hens, 7—1st, 2nd, and 3rd, Hintonburg Poultry Yards.
Cockerels, 11—1st, and 3rd, Hintonburg Poultry Yards, 2nd, Robert Palen.
Pullets, 6—1st and 2nd, Hintonburg Poultry Yards; 3rd, Robert Palen.

BUFF WYANDOTTES.

Cocks, 5—1st and 3rd, Tooker & Bowey; 2nd, John Mason & Son.
Hens, 10—1st and 3rd, John Mason & Son; 2nd, C. M. Taylor.
Cockerels, 8—1st, C. M. Taylor; 2nd, John Mason & Son; 3rd, R. E. Blakely.
Pullets, 12—1st, John Mason & Son; 2nd, 3rd, and 4th, C. M. Taylor.

WHITE WYANDOTTES.

Cocks, 13—1st Jos. Russell; 2nd, Hintonburg Poultry Yards; 3rd, G. Lake; 4th, W. J. Bulloch; 5th, Highland Park Poultry Yards.

Hens, 22—1st and 2nd, Jos. Russell; 3rd, Highland Park Poultry Yards; 4th, Hintonburg Poultry Yards; 5th, W. J. Bulloch.

Cockerels, 21—1st, Highland Park Poultry Yards; 2nd, Jos. Russell; 3rd, G. Lake; 4th and 5th, Hintonburg Poultry Yards.

Pullets, 24—1st, Highland Park Poultry Yards; 2nd, B. J. Hunt; 3rd, Jos. Russell; 4th, W. J. Bulloch; 5th, McDougall & Bedlow.

PARTRIDGE WYANDOTTES.

Cocks, 6—1st and 3rd, J. E. Fidler; 2nd, G. M. Matheson.

Hens, 5,—1st and 3rd, J. E. Fidler; 2nd, G. M. Matheson.

Cockerels, 7—1st and 3rd, Geo. Higman, Jr.; 2nd, J. E. Fidler.

Pullets, 9—1st, Geo. Higman, Jr.; 2nd, G. M. Matheson; 3rd, J. E. Fidler.

COLUMBIAN WYANDOTTES.

Cocks, 3—1st, E. R. Frith; 2nd and 3rd, W. C. Pranschke.

Hens, 6—1st and 2nd, W. C. Pranschke; 3rd, E. R. Frith.

Cockerels, 5—1st, A. & T. Readwin; 2nd, E. R. Frith; 3rd, W. C. Pranschke.

Pullets, 5—1st and 2nd, W. C. Pranschke; 3rd, E. R. Frith.

A. O. V. WYANDOTTES.

Cocks, 7—1st, G. & J. Bogue; 2nd, Jas. Snetsinger; 3rd, Scott & Milroy.

Hens, 8—1st, G. & J. Bogue; 2nd, Scott & Milroy; 3rd, C. M. Evans.

Cockerels, 5—1st, Scott & Milroy; 2nd, T. G. Dunlop; 3rd, C. M. Evans.

Pullets, 5—1st, C. M. Evans; 2nd, A. & T. Readwin; 3rd, Tooker & Bowey.

BLACK JAVAS.

Cocks, 5—1st, R. Oke· 2nd, Point Fortune Poultry Yards; 3rd, Geo. Robertson.

Hens, 7—1st, J. H. Warrington; 2nd, R. Oke; 3rd, Geo. Robertson.

Cockerels, 6—1st, and 3rd, G. & J. Bogue; 2nd, R. Oke.

Pullets, 5—1st and 3rd, G. & J. Bogue; 2nd, J. H. Warrington.

MOTTIED JAVAS.

Cocks, 2—1st, G. & J. Bogue; 2nd, R. Oke.

Hens, 2—1st, G. & J. Bogue; 2nd, R. Oke.

Cockerels, 2—1st, R. Oke; 2nd, G. & J. Bogue.

Pullets, 2—1st and 2nd, G. & J. Bogue.

R. C. RHODE ISLAND REDS.

Cocks, 5—1st and 3rd, Hintonburg Poultry Yards; 2nd, John I. Gill.

Hens, 5—1st, 2nd and 3rd, Hintonburg Poultry Yards.

Cockerels, 6—1st, 2nd, and 3rd, Hintonburg Poultry Yards.

Pullets, 6—1st and 2nd, Hintonburg Poultry Yards; 3rd, J. F. Reason.

S. C. RHODE ISLAND REDS.

Cocks, 4—1st, Wheadon & Pearson; 2nd, Hintonburg Poultry Yards; 3rd, J. Allan Grimes.

Hens, 6—1st, Wheadon & Pearson; 2nd, Hintonburg Poultry Yards; 3rd, J. Allan Grimes.

Cockerels, 9—1st, A. P. Hillhouse; 2nd, Jos. Russell; 3rd, Wheadon & Pearson.

Pullets, 9—1st, J. Allan Grimes; 2nd, A. P. Hillhouse; 3rd, Hintonburg Poultry Yards.

B. B. RED GAMES.

Cocks, 2—1st, W. Barber.

Hens, 3—1st and 2nd, W. Barber; 3rd, Point Fortune Poultry Yards.

Cockerels, 1—1st, J. Lawson.

Pullets, 4—1st and 2nd, W. Barber; 3rd, J. Lawson.

BROWN RED GAMES.

Hens, 3—1st and 2nd, W. Barber; 3rd, W. H. Reid.

Pullets, 2—1st and 2nd, W. Barber.

DUCKWING GAMES.

Cocks, 2—1st and 2nd, W. Barber.

Hens, 2—1st and 2nd, W. Barber.

Cockerels, 2—1st and 2nd, W. Barber.

Pullets, 2—1st and 2nd, W. Barber.

PYLE GAMES.

Cocks, 3—1st, McIntosh & Halliday; 2nd and 3rd, W. Barber.
Hens, 3—1st, McIntosh & Halliday; 2nd and 3rd, W. Barber.
Cockerels, 3—1st and 3rd, W. Barber; 2nd, McIntosh & Halliday.
Pullets, 3—1st, McIntosh & Halliday; 2nd, W. Barber; 3rd, W. Barber.

C. INDIAN GAMES. (LACED.)

Cocks, 5—1st, Chas. LaRose; 2nd and 3rd, Pritchard Bros.
Hens, 6—1st, Chas. LaRose; 2nd, Pritchard Bros.; 3rd, Point Fortune Poultry Yards.
Cockerels, 5—1st, Point Fortune Poultry Yards; 2nd and 3rd, Pritchard Bros.
Pullets, 6—1st, Chas. LaRose; 2nd, Point Fortune P. Y.; 3rd, Pritchard Bros.

A. O. S. V. OR W. INDIAN GAMES.

Cocks, 4—1st, H. R. K. Tozer; 2nd, J. H. Warrington; 3rd, W. H. Reid.
Hens, 3—1st, H. R. K. Tozer; 2nd, J. Lawson.
Cockerels, 3—1st, H. R. K. Tozer; 2nd, W. J. Teale.
Pullets, 3—1st, W. J. Teale; 2nd, H. R. K. Tozer; 3rd, W. Barber.

OLD ENGLISH OR PIT GAMES.

Cocks, 5—1st and 3rd, E. H. Benjamin; 2nd, McDougall & Bedlow.
Hens, 5—1st, E. H. Benjamin; 2nd, J. V. McAree; 3rd, McDougall & Bedlow.
Cockerels, 4—1st and 3rd, E. H. Benjamin; 2nd, J. Lawson.
Pullets, 3—1st, 2nd, and 3rd, E. H. Benjamin.

S. C. WHITE LEGHORNS.

Cock, 9—1st and 3rd, Jas. L. McCormack; 2nd, Donald McKellar.
Hen, 13—1st and 2nd, Jas. L. McCormack; 3rd and 4th, Donald McKellar.
Cockerels, 21—1st, Jas. L. McCormack; 2nd, W. H. Carleton; 3rd, F. Wales, 4th, Donald McKellar.
Pullets, 19—1st and 3rd, W. H. Carleton; 2nd, Donald McKellar; 4th, Jas. L. McCormack; 5th, John A. Belford.

S. C. BROWN LEGHORNS.

Cock, 10—1st, H. F. Becker; 2nd, W. A. Gurney; 3rd, A. J. Engel.
Hen, 14—1st, G. G. Henderson; 2nd, H. F. Becker; 3rd, W. A. Gurney; 4th, Jas. Snetsinger.
Cockerel, 20—1st and 2nd, A. J. Engel; 3rd, H. F. Becker; 4th, G. H. A. Collins; 5th, W. A. Gurney.
Pullet, 12—1st and 2nd, W. A. Gurney; 3rd, G. G. Henderson; 4th, G. H. A. Collins.

S. C. BLACK LEGHORNS.

Cock, 3—1st, A. & T. Readwin; 2nd, W. M. Osborne; 3rd, Geo. Robertson.
Hen, 6—1st, W. M. Osborne; 2nd and 3rd, A. & T. Readwin.
Cockerel, 6—1st, W. M. Osborne; 2nd, A. & T. Readwin; 3rd, Geo. Robertson.
Pullet, 6—1st and 2nd, Geo. Robertson; 3rd, W. M. Osborne.

S. C. BUFF LEGHORNS.

Cock, 3—1st, Jas. Snetsinger; 2nd, S. E. Ellis; 3rd, McIntosh & Halliday.
Hens, 5—1st and 2nd, S. E. Ellis; 3rd, Frank Stagg.
Cockerel, 4—1st, S. E. Ellis; 2nd and 3rd, Frank Stagg.
Pullet, 3—1st and 2nd, S. E. Ellis; 3rd, McIntosh & Halliday.

R. C. BROWN LEGHORNS.

Cock, 2—1st, H. R. K. Tozer; 2nd, C. H. Wilson.
Hen, 3—1st, C. H. Wilson; 2nd, H. R. K. Tozer; 3rd, W. H. Reid.
Cockerel, 4—1st, C. H. Wilson; 2nd, McIntosh & Halliday; 3rd, W. H. Reid.
Pullet, 4—1st, C. H. Wilson; 2nd, H. R. K. Tozer; 3rd, W. H. Reid.

R. C., A. O. S. V. LEGHORNS.

Cock, 6—1st, Geo. Robertson; 2nd, Richard Oke; 3rd, M. R. Hoover.
Hen, 7—1st, A. & T. Readwin; 2nd and 3rd, Geo. Robertson.
Cockerel, 4—1st, M. R. Hoover; 2nd, Jas. Snetsinger; 3rd, Geo. Robertson.
Pullet, 6—1st and 2nd, Geo. Robertson; 3rd, M. R. Hoover

SPANISH.

Cock, 3—1st, G. & J. Bogue; 2nd and 3rd, J. H. Warrington.
Hen, 2—1st, J. H. Warrington; 2nd, G. & J. Bogue.
Cockerel, 6—1st, J. H. Warrington; 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.
Pullet, 5—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, McDougall & Bedlow.

ANDALUSIAN.

Cock, 2—1st, Baker Bros; 2nd, Chas. LaRose.
Hen, 3—1st, Baker Bros.; 2nd and 3rd, Chas. LaRose.
Cockerel, 4—1st, Chas. LaRose; 2nd. Baker Bros.; 3rd, Geo. Robertson.
Pullet, 3—1st and 2nd, Chas. LaRose; 3rd, Baker Bros.

BLACK MINORCA.

Cock, 9—1st and 2nd, L. V. Zavitz; 3rd, E. R. Frith.
Hen, 13—1st and 2nd, Wm. Ellis; 3rd and 4th, L. V. Zavitz.
Cockerel, 21—1st, and 2nd, Hintonburg Poultry Yards; 3rd, 4th and 5th, L. V. Zavitz.
Pullet, 21—1st, 2nd, 4th and 5th, L. V. Zavitz; 3rd, Hintonburg Poultry Yards.

WHITE MINORCAS.

Cock, 4—1st, A. C. Moyer; 2nd, W. M. Osborne; 3rd, J. A. Benson.
Hen, 6—1st, A. C. Moyer; 2nd and 3rd, J. A. Benson.
Cockerel, 3—1st, A. C. Moyer; 2nd, W. M. Osborne; 3rd, J. A. Benson.
Pullet, 5—1st and 3rd, A. C. Moyer; 2nd, J. M. Peaker.

BUFF ORPINGTON.

Cock, 4—1st and 2nd, A. W. E. Hellyer; 3rd, D. B. Alexander.
Hen, 5—1st, 2nd and 3rd, A. W. E. Hellyer.
Cockerel, 11—1st and 2nd, A. W. E. Hellyer; 3rd, H. A. Hoffman.
Pullet, 9—1st and 2nd, A. W. E. Hellyer; 3rd, H. A. Hoffman.

WHITE ORPINGTON.

Cock, 2—1st, M. C. Neate; 2nd, Jas. Snetsinger.
Hen, 2—1st and 2nd, Jas. Snetsinger.
Cockerel, 1—1st, Jas. Snetsinger.
Pullet, 2—1st and 2nd, Jas. Snetsinger.

A. O. V. ORPINGTON.

Cocks, 6—1st, E. A. Rawlings; 2nd and 3rd, Hamilton & Scoyne.
Hen, 9—1st, Hintonburg Poultry Yards; 2nd, W. H. Slinn; 3rd, Hamilton & Scoyne.
Cockerel, 14—1st and 4th, Hamilton & Scoyne; 2nd, J. V. Mulville; 3rd, Hintonburg Poultry Yards.
Pullet, 14—1st, Hamilton & Scoyne; 2nd, Rev. T. J. Stiles; 3rd, 4th, J. V. Mulville.

SILVER GRAY DORKING.

Cock, 4—1st, J. H. Warrington; 2nd, C. H. Wilson; 3rd, McDougall & Bedlow.
Hen, 5—1st, Point Fortune Poultry Yards; 2nd, McDougall & Bedlow; 3rd, W. H. Reid.
Cockerel, 3—1st, Jas. Snetsinger; 2nd and 3rd, McDougall & Bedlow.
Pullet, 3—1st and 2nd, McDougall & Bedlow; 3rd, J. Snetsinger.

COLORED DORKING.

Cock, 2—1st, J. H. Warrington; 2nd, G. & J. Bogue.
Hen, 5—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Geo. Robertson.
Cockerel, 4—1st, J. H. Warrington; 2nd, G. & J. Bogue; 3rd, Geo. Robertson.
Pullet, 5—1st, J. H. Warrington; 2nd and 3rd, G. & J. Bogue.

WHITE DORKING.

Cock, 1—1st, J. H. Warrington.
Hen, 2—1st and 2nd, J. H. Warrington.
Cockerel, 3—1st and 2nd, J. H. Warrington.
Pullet 3—1st and 2nd, J. H. Warrington: 3rd, Jas. Snetsinger.

HOUDAN.

Cock, 3—1st, G. & J. Bogue; 2nd, McIntosh & Halliday; 3rd, McDougall & Bedlow.
Hens, 3—1st, G. & J. Bogue; 2nd, McDougall & Bedlow; 3rd, McIntosh & Halliday.
Cockerel, 5—1st and 3rd, G. & J. Bogue; 2nd, McDougall & Bedlow.
Pullet, 5—1st and 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.

CREVE-COEUR.

Cock, 2—1st, G. & J. Bogue; 2nd, J. H. Warrington.
Hen, 3—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Richard Oke.
Cockerels, 3—1st and 3rd, G. & J. Bogue; 2nd, Richard Oke.
Pullet, 2—1st and 2nd, G. & J. Bogue.

LAFLECHE.

Cock, 2—1st, G. & J. Bogue; 2nd, J. H. Warrington.
Hen, 3—1st, J. H. Warrington; 2nd, Richard Oke; 3rd, G. & J. Bogue.
Cockerel, 2—1st, Richard Oke; 2nd, G. & J. Bogue.
Pullet, 3—1st, G. & J. Bogue; 2nd, J. H. Warrington; 3rd, Richard Oke.

FAVEROLLE.

Cock, 1—1st, McIntosh & Halliday.
Hen, 1—1st, McIntosh & Halliday.
Pullet, 1—1st, McIntosh & Halliday.

BLACK HAMBURG.

Cock, 6—1st, Wheadon & Pearson; 2nd, Richard Oke; 3rd, H. Baptie.
Hen, 10—1st and 3rd, Richard Oke; 2nd, H. Baptie.
Cockerel, 4—1st, Richard Oke; 2nd, Wheadon & Pearson; 3rd, Point Fortune Poultry Yards.
Pullet, 5—1st and 2nd, Richard Oke; 3rd, Wheadon & Pearson.

G. P. HAMBURG.

Cock, 2—1st, Richard Oke; 2nd, Point Fortune Poultry Yards.
Hen, 3—1st, Richard Oke; 2nd and 3rd, Point Fortune Poultry Yards
Cockerel, 3—1st, Richard Oke; 2nd and 3rd, Point Fortune Poultry Yards.
Pullet, 4—1st and 2nd, Richard Oke; 3rd, Point Fortune Poultry Yards.

S. P. HAMBURG.

Cock, 2—1st, Richard Oke; 2nd, Point Fortune Poultry Yards.
Hen, 3—1st, Richard Oke; 2nd and 3rd, Point Fortune Poultry Yards.
Cockerel, 3—1st, Richard Oke; 2nd and 3rd, Point Fortune.
Pullet, 4—1st and 2nd, Richard Oke; 3rd, Point Fortune.

G. S. HAMBURG.

Cock, 4—1st, G. & J. Bogue; 2nd, R. Oke; 3rd, H. Baptie.
Hen, 5—1st, 2nd and 3rd, H. Baptie.
Cockerel, 4—1st, R. Oke; 2nd, G. & J. Bogue; 3rd, H. Baptie.
Pullet, 3—1st, H. Baptie; 2nd, R. Oke.

S. S. HAMBURG.

Cock, 6—1st, R. Oke; 2nd, H. Baptie; 3rd, Emmet Reid.
Hen, 5—1st, R. Oke; 2nd and 3rd, Point Fortune Poultry Yards.
Cockerel, 5—1st, H. Baptie; 2nd and 3rd, W. H. Fennell.
Pullet, 8—1st and 3rd, H. Baptie; 2nd, R. Oke.

RED CAP.

Cock, 1—1st, Jas. Snetsinger.
Hen, 1—1st, J. H. Warrington.
Cockerel, 1—1st, McIntosh & Halliday
Pullet, 1—1st, McIntosh & Halliday.

W. C. B. POLAND.

Cock, 1—1st, Wm. McNeil.
Hen, 5—1st and 2nd, Wm. McNeil; 3rd, J. A. Barrett.
Cockerel, 3—1st and 2nd, Wm. McNeil; 3rd, J. A. Barrett.
Pullet, 3—1st and 2nd, Wm. McNeil; 3rd, Point Fortune Poultry Yards.

GOLDEN POLAND.

Cock, 4—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.
Hen, 4—1st, G. & J. Bogue; 2nd, Wm. McNeil; 3rd, Point Fortune Poultry Yards.
Cockerel, 5—1st and 3rd, G. & J. Bogue; 2nd, Wm. McNeil.
Pullet, 5—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.

SILVER POLAND.

Cock, 4—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.
Hen, 4—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Cockerel, 4—1st and 2nd, Wm. McNeil; 3rd, G. & J. Bogue.
Pullet, 4—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.

WHITE POLAND.

Cock, 2—1st and 2nd, Wm. McNeil. *Cockerel, 2*—1st and 2nd, Wm. McNeil.
Hen, 2—1st and 2nd, Wm. McNeil. *Pullet, 2*—1st and 2nd, Wm. McNeil.

A. O. S. V. POLAND.

Cock, 3—1st, G. & J. Bogue; 2nd and 3rd, Wm. McNeil.
Hen, 5—1st and 2nd, G. & J. Bogue; 3rd, Wm. McNeil.
Cockerel, 4—1st and 3rd, G. & J. Bogue; 2nd, Wm. McNeil.
Pullet, 4—1st and 3rd, Wm. McNeil; 2nd, G. & J. Bogue.

A. O. S. V. FOWLS.

Cock, 2—1st, G. & J. Bogue; 2nd, F. Wales.
Hen, 4—1st, G. & J. Bogue; 2nd, Point Fortune Poultry Yards, 3rd, Richard Oke.
Cockerel, 4—1st, J. H. Warrington; 2nd, Scott & Milroy; 3rd, F. Wales.
Pullet, 4—1st, J. H. Warrington; 2nd, Scott & Milroy; 3rd, F. Wales.

BLACK RED GAME BANTAMS.

Cock, 5—1st, Rook Bros.; 2nd, Mutchmore & Co.; 3rd, Wheadon & Pearson.
Hens, 5—1st, Rook Bros.; 2nd, Mutchmor & Co.; 3rd, W. Barber.
Cockerel, 2—1st, Rook Bros.; 2nd, W. Barber.
Pullet, 4—1st, Rook Bros.; 2nd, W. Barber; 3rd, Mutchmore & Co.

BROWN RED GAME BANTAMS.

Cock, 4—1st, Wheadon & Pearson; 2nd, Mutchmor & Co.; 3rd, W. Barber.
Hen, 4—1st, Wheadon & Pearson; 2nd, Mutchmor & Co.; 3rd, W. Barber.
Cockerel, 3—1st and 3rd, W. Barber; 2nd, Wheadon & Pearson.
Pullet, 5—1st, Mutchmor & Co.; 2nd, W. Barber; 3rd, Wheadon & Pearson.

DUCKWING GAME BANTAMS.

Cock, 4—1st, Mutchmor & Co.; 2nd, Wheadon & Pearson; 3rd, W. Barber
Hen, 5—1st, W. Barber; 2nd, Mutchmor & Co.; 3rd, Wheadon & Pearson.
Cockerel, 5—1st and 3rd, Wheadon & Pearson; 2nd, Mutchmor & Co.
Pullet, 4—1st and 3rd, W. Barber; 2nd, Mutchmor & Co.

PYLE GAME BANTAMS.

Cock, 4—1st, Wheadon & Pearson; 2nd, W. Barber; 3rd, Mutchmor & Co.
Hen, 5—1st, Rook Bros.; 2nd and 3rd, W. Barber.
Cockerel, 5—1st, Rook Bros.; 2nd, W. Barber; 3rd, Mutchmor & Co.
Pullet, 5—1st, Mutchmor & Co., 2nd, Rook Bros.; 3rd, W. Barber.

A. O. V. GAME BANTAMS.

Cock, 4—1st, Rook Bros.; 2nd, P. E. Aird; 3rd, J. V. McAree.
Hen, 4—1st, Mutchmor & Co.; 2nd, Wheadon & Pearson; 3rd, Rook Bros.
Cockerel, 2—1st, Rook Bros.; 2nd, Wheadon & Pearson.
Pullet, 2—1st, Wheadon & Pearson; 2nd, Rook Bros.

G. SEBRIGHT BANTAMS.

Cock, 4—1st, Richard Oke; 2nd, Wheadon & Pearson; 3rd, L. V. Zavitz.
Hen, 4—1st, Richard Oke; 2nd, G. & J. Bogue; 3rd, Wheadon & Pearson.
Cockerel, 4—1st, Richard Oke; 2nd, Wheadon & Pearson; 3rd, L. V. Zavitz.
Pullet, 5—1st and 2nd, Richard Oke; 3rd, Wheadon & Pearson.

S. SEBRIGHT BANTAMS.

Cock, 4—1st, Richard Oke; 2nd, L. V. Zavitz; 3rd, Wheadon & Pearson.
Hen, 5—1st, Richard Oke; 2nd, Wheadon & Pearson; 3rd, L. V. Zavitz.
Cockerel, 3—1st, Richard Oke; 2nd, Wheadon & Pearson; 3rd, L. V. Zavitz.
Pullet, 4—1st and 2nd, Richard Oke; 3rd, Wheadon & Pearson.

B. (R. C. B.) BANTAM.

Cock, 7—1st and 2nd, Wheadon & Pearson; 3rd, W. J. Slessor.
Hen, 7—1st, 2nd and 3rd, Wheadon & Pearson.
Cockerel, 6—1st and 3rd, Wheadon & Pearson; 2nd, Richard Oke.
Pullet, 6—1st and 2nd, Wheadon & Pearson; 3rd, R. Oke.

BUFF COCHIN BANTAM.

Cock, 4—1st, Richard Oke; 2nd, Beaton & Stoate; 3rd, Doidge & McNeil.
Hen, 5—1st, Shaw & McIntosh; 2nd, Doidge & McNeil; 3rd, Beaton & Stoate.
Cockerel, 3—1st, Doidge & McNeil; 2nd, Shaw & McIntosh; 3rd, Beaton & Stoate.
Pullet, 4—1st, Doidge & McNeil; 2nd, R. Oke; 3rd, Shaw & McIntosh.

WHITE COCHIN BANTAM.

Cock, 5—1st and 3rd, Doidge & McNeil; 2nd, Wheadon & Pearson.
Hen, 4—1st and 2nd, Doidge & McNeil; 3rd, Wheadon & Pearson.
Cockerel, 4—1st and 2nd, Doidge & McNeil; 3rd, Wheadon & Pearson.
Pullet, 4—1st and 2nd, Doidge & McNeil; 3rd, Wheadon & Pearson.

PARTRIDGE COCHIN BANTAM.

Cock, 3—1st, G. & J. Bogue; 2nd, Wheadon & Pearson; 3rd, H. R. K. Tozer.
Hen, 3—1st, G. & J. Bogue; 2nd, Wheadon & Pearson; 3rd, H. R. K. Tozer.
Cockerel, 2—1st, Wheadon & Pearson; 2nd, H. R. K. Tozer.
Pullet, 2—1st, H. R. K. Tozer; 2nd, Wheadon & Pearson.

A. O. V. COCHIN BANTAM.

Cock, 7—1st, F. Wales; 2nd and 3rd, Doidge & McNeil.
Hen, 7—1st, W. J. Slessor; 2nd, Howard Fraleigh; 3rd, Wheadon & Pearson.
Cockerel, 7—1st, Wheadon & Pearson; 2nd, W. J. Slessor; 3rd, Howard Fraleigh.
Pullet, 7—1st and 3rd, Doidge & McNeil; 2nd, W. J. Slessor.

JAPANESE BANTAM.

Cock, 3—1st and 2nd, Richard Oke; 3rd, Rook Bros.
Hen, 3—1st and 3rd, Richard Oke; 2nd, Rook Bros.
Cockerel, 4—1st and 2nd, L. V. Zavitz; 3rd, Richard Oke.
Pullet, 4—1st and 2nd, L. V. Zavitz; 3rd, Richard Oke.

A. O. S. V. BANTAM.

Cock, 7—1st, Richard Oke; 2nd, G. & J. Bogue; 3rd, Wheadon & Pearson.
Hen, 7—1st, G. & J. Bogue; 2nd, Richard Oke; 3rd, Wheadon & Pearson.
Cockerel, 5—1st, G. & J. Bogue; 2nd and 3rd, R. Oke.
Pullet, 7—1st and 2nd, Richard Oke; 3rd, G. & J. Bogue.

BRONZE TURKEY.

Male, old, 3—1st, Jas. Snetsinger; 2nd, A. Thompson; 3rd, A. H. Foster.
Female, old, 5—1st, Geo. R. Bradley; 2nd and 3rd, Jas. Snetsinger.
Male, young, 9—1st and 2nd, Geo. R. Bradley; 3rd, A. H. Foster.
Female, young, 7—1st, Jas. Snetsinger; 2nd, Chesley Pillar; 3rd, A. Thompson.

WHITE TURKEY.

Male, old, 2—1st, Baker Bros.; 2nd, Geo. Baker.
Female, old, 4—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Male, young, 4—1st, Geo. Baker; 2nd, Baker Bros.; 3rd, A. Thompson.
Female, young, 4—1st, Baker Bros.; 2nd and 3rd, A. Thompson.

A. O. S. V. TURKEY.

Female, old, 2—1st and 2nd, A. Thompson.
Male, young, 4—1st and 2nd, A. Thompson; 3rd, Baker Bros.
Female, young, 4—1st and 3rd, A. Thompson; 2nd, Baker Bros.

TOULOUSE GEESE.

Male, old, 3—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Female, old, 3—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Male, young, 2—1st, Baker Bros.; 2nd, A. Thompson.
Female, young, 2—1st, Baker Bros.; 2nd, A. Thompson.

EMBDEN GEESE.

Male, old, 3—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Female, old, 3—1st and 3rd, A. Thompson; 2nd, Baker Bros.
Male, young, 3—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Female, young, 3—1st and 2nd, A. Thompson; 3rd, Baker Bros.

CHINA GEESE.

Male, old, 2—1st and 2nd, A. Thompson.
Female, old, 2—1st and 2nd, A. Thompson.
Male, young, 2—1st and 2nd, A. Thompson.
Female, young, 2—1st and 2nd, A. Thompson.

A. O. V. GEESE.

Male, old, 4—1st, Baker Bros.; 2nd and 3rd, A. Thompson; 4th, Jos. Fortier.
Female, old, 3—1st, Baker Bros.; 2nd, A. Thompson; 3rd, Jos. Fortier.
Male, young, 3—1st, Baker Bros.; 2nd, A. Thompson; 3rd, Jos. Fortier.
Female, young, 3—1st, Baker Bros.; 2nd, A. Thompson; 3rd, Jos. Fortier.

ROUEN DUCK.

Male, old, 4—1st, Baker Bros.; 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.
Female, old, 5—1st and 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.
Male, young, 6—1st and 2nd, Baker Bros.; 3rd, Geo. Robertson.
Female, young, 5—1st and 2nd, G. & J. Bogue; 3rd, Baker Bros.

PEKIN DUCK.

Male, old, 4—1st, Baker Bros.; 2nd, Tooker & Bowey; 3rd, Jas. Snetsinger.
Female, old, 4—1st, Baker Bros.; 2nd, Jas. Snetsinger; 3rd, Tooker & Bowey.
Male, young, 4—1st, Baker Bros.; 2nd, Jas. Snetsinger; 3rd, Geo. Robertson.
Female, young, 3—1st, Baker Bros.; 2nd, Jas. Snetsinger; 3rd, A. Thompson.

AYLESBURY DUCK.

Male, old, 5—1st and 2nd, G. & J. Bogue; 3rd, A. Thompson.
Female, old, 4—1st and 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.
Male, young, 3—1st and 2nd, G. & J. Bogue; 3rd, A. Thompson.
Female, young, 4—1st and 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.

CAYUGA DUCK.

Male, old, 5—1st, Baker Bros.; 2nd, J. H. Warrington; 3rd, G. & J. Bogue.
Female, old, 4—1st, Baker Bros.; 2nd, Geo. Robertson; 3rd, A. Thompson.
Male, young, 6—1st, Baker Bros.; 2nd and 3rd, Geo. Robertson.
Female, young, 6—1st, Baker Bros.; 2nd, Geo. Robertson; 3rd, J. H. Warrington.

INDIAN RUNNER DUCKS.

Male, old, 1—1st, A. Thompson.
Female, old, 2—1st, A. Thompson; 2nd, Geo. Robertson.
Male, young, 2—1st, A. Thompson; 2nd, Geo. Robertson.
Female, young, 1—1st, A. Thompson.

A. O. V. DUCK.

Male, old, 4—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Female, old, 4—1st, Baker Bros.; 2nd and 3rd, A. Thompson.
Male, young, 3—1st and 2nd, A. Thompson; 3rd, McDougall & Bedlow.
Female, young, 3—1st and 2nd, A. Thompson; 3rd, McDougall & Bedlow.

PIGEONS.

CARRIERS.

Cock, 5—1st and 2nd, E Limon. *Hens, 6*—1st and 2nd, E. Limon.

WHITE POUTER.

Cocks, 4—1st, J. H. McGill, 2nd, Mutchmore & Co.
Hens, 5—1st, Mutchmore & Co.; 2nd, E. Limon.

A. O. C. POUTER.

Cocks, 7—1st, John Belford, 2nd, W. H. Reid.
Hens, 7—1st, J. H. Magill, 2nd, W. H. Reid.

PIGMY POUTER.

Cocks, 8—1st and 2nd, E. Limon. *Hens, 8*—1st, E. Limon, 2nd, W. H. Reid.

L. F. MUFFED TUMBLERS.

Cocks, 1—1st, A. & T. Readwin. *Hens, 1*—1st, A. & T. Readwin.

L. F. CLEAN LEG TUMBLERS.

Cocks, 8—1st, J. V. McAree, 2nd, Bert Sheward.
Hens, 7—1st, Bert Sheward; 2nd, A. & T. Readwin.

S. F. TUMBLERS.

Cocks, 2—1st, W. H. Reid; 2nd, A. & T. Readwin.
Hens, 2—1st, W. H. Reid; 2nd, A. & T. Readwin.

ANY COLOR BARB.

Cocks, 3—1st and 2nd, C. H. Currier.
Hens, 3—1st, C. H. Currier; 2nd, L. Ridler.

TRUMPETERS.

Cocks, 5—1st, L. Ridler, 2nd, W. H. Read.
Hens, 5—1st, L. Ridler, 2nd, W. H. Read.

JACOBINS, R. OR Y.

Cocks, 5—1st, C. H. Currier; 2nd, W. H. Read.
Hens, 6—1st, W. H. Read; 2nd, C. H. Currier.

WHITE JACOBIN.

Cocks, 4—1st, W. H. Read; 2nd, C. H. Currier.
Hens, 5—1st, C. H. Currier; 2nd, W. H. Read.

A. O. S. C. JACOBIN.

Cocks, 3—1st and 2nd, W. H. Reid. *Hens, 3*—1st and 2nd, W. H. Reid.

SILVER DUN ANTWERPS.

Cocks, 2—1st and 2nd, W. H. Reid. *Hens, 2*—1st and 2nd, W. H. Reid.

WHITE FANTAILS.

Cocks, 6—1st, J. V. McAree; 2nd, Mutchmore & Co.
Hens, 5—1st, Mutchmore & Co.; 2nd, J. V. McAree.

BLUE FANTAIL.

Cocks, 2—1st, A. & T. Readwin; 2nd, W. H. Reid.
Hens, 2—1st, A. & T. Readwin; 2nd, W. H. Reid.

A. O. S. C. FANTAILS.

Cocks, 3—1st. Hiawatha Pigeon Lofts; 2nd, W. H. Reid.
Hens, 3—1st, W. H. Reid; 2nd, A. & T. Readwin.

BLACK MAGPIE.

Cocks, 6—1st and 2nd, Mutchmore & Co. *Hens, 4*—1st and 2nd, L. Ridler.

RED MAGPIE.

Cocks, 9—1st, Mutchmore & Co.; 2nd, L. Ridler.
Hens, 7—1st and 2nd, L. Ridler.

A. O. C. MAGPIE.

Cocks, 7—1st, L. Ridler; 2nd, Mutchmore & Co.
Hens, 5—1st, L. Ridler; 2nd, Mutchmore & Co.

BLUE CHEQUERED SHOW HOMER.

Cocks, 4—1st and 2nd, Alfred Knight. *Hens, 5*—1st and 2nd, Alfred Knight.

A. O. C. SHOW HOMER

Cocks, 4—1st and 2nd, Alfred Knight. *Hens, 4*—1st and 2nd, Alfred Knight.

BLUE FLYING HOMER.

Cocks, 4—1st, R. E. Blakeley: 2nd, Hiawatha Pigeon Lofts.
Hens, 3—1st, A. & T. Readwin; 2nd, R. E. Blakeley.

A. O. C. FLYING HOMER.

Cocks, 7—1st, John Belford; 2nd, A. & T. Readwin.
Hens, 8—1st, C. C. Cornish; 2nd, A. & T. Readwin.

BLACK SWALLOW.

Cocks, 4—1st, W. H. Reid; 2nd, A. & T. Readwin.
Hens, 3—1st, A. & T. Readwin; 2nd, W. H. Reid

A. O. S. C. SWALLOW.

Cocks, 4—1st, W. H. Reid; 2nd, L. Ridler.
Hens, 3—1st, A. & T. Readwin: 2nd, L. Ridler.

A. O. C. SWALLOWS.

Cocks, 5—1st, L. Ridler; 2nd, W. H. Reid.
Hens, 4—1st, W. H. Reid; 2nd, Mutchmore & Co.

DRAGOONS.

Cocks, 5—1st and 2nd, J. V. McAree.
Hens, 4—1st, J. V. McAree; 2nd, L. Ridler.

ARCHANGELS.

Cocks, 5—1st, W. H. Reid; 2nd, A. & T. Readwin.
Hens, 6—1st, Willie Dowler; 2nd, E. K. Dallimore.

BLACK NUN.

Cocks, 3—1st, A. & T. Readwin; 2nd, L. Ridler.
Hens, 4—1st, L. Ridler; 2nd, W. H. Reid.

A. O. C. NUN.

Cocks, 3—1st. L. Ridler; 2nd, W. H. Reid.
Hens, 4—1st, L. Ridler; 2nd, A. & T. Readwin.

WHITE AFRICAN OWLS.

Cocks, 3—1st, W. H. Reid 2nd, Mutchmore & Co.
Hens, 2—1st and 2nd, W. H. Reid.

A. O. C. AFRICAN OWLS.

Cocks, 2—1st and 2nd, W. H. Reid. *Hens, 2*—1st and 2nd. W. H. Reid.

ENGLISH OWLS, ANY VARIETY.

Cocks, 2—1st, C. H. Currier; 2nd, A. & T. Readwin. *Hens, 1*—1st, W. H. Reid.

A. O. V. OWLS.

Cocks, 2—1st and 2nd, W. H. Reid. *Hens, 2*—1st and 2nd, W. H. Reid.

BLACK TURBITS.

Cocks, 4—1st and 2nd, Bert Sheward. *Hens, 4*—1st and 2nd, Bert Sheward.

BLUE TURBITS.

Cocks, 2—1st and 2nd, Bert Sheward. *Hens, 3*—1st and 2nd, Bert Sheward.

A. O. C. TURBITS.

Cocks, 3—1st and 2nd, Bert Sheward. *Hens, 3*—1st and 2nd, Bert Sheward.

A. O. S. VARIETY.

Cocks, 4—1st, J. V. McAree; 2nd, C. H. Currier.
Hens, 4—1st, C. H. Currier; 2nd, J. V. McAree.

BELGIAN HARES OVER 6 MONTHS.

Males, 1—1st, George Robertson. *Females, 1*—1st, George Robertson.

BELGIAN HARES UNDER 6 MONTHS.

Males, 1—1st, George Robertson. *Females, 1*—1st, George Robertson.

SELLING CLASS

DORKINGS.

Males, 4—1st, W. H. Reid; 2nd, J. & G. Bogue; 3rd, McDougall & Bedlow.
Females, 6—1st, W. H. Reid; 2nd, G. & J. Bogue; 3rd, McDougall & Bedlow.

BRAHMAS.

Males, 3—1st, C. C. Cornish; 2nd, Chas. LaRose; 3rd, McDougall & Bedlow.
Females, 4—1st and 3rd, C. C. Cornish; 2nd, Chas. LaRose. -

PLYMOUTH ROCKS.

Males, 14—1st, 2nd, and 3rd, F. A. James.
Females, 3—1st, F. A. James; 2nd, M. R. Hoover; 3rd, George Robertson.

WYANDOTTES.

Males, 32—1st and 2nd, B. J. Hunt; 3rd, G. Lake.
Females, 11—1st, G. Lake; 2nd, Hintonburg Poultry Yards; 3rd, M. C. Neate.

RHODE ISLAND REDS.

Males, 8—1st, John I. Gill; 2nd, J. A. Grimes; 3rd, R. L. Wheadon.
Females, 2—1st, R. L. Wheadon; 2nd, John I. Gill.

ORPINGTONS.

Males, 13—1st, Hintonburg Poultry Yards; 2nd, M. C. Neate; 3rd, W. H. Slinn
Females, 9—1st, W. H. Slinn; 2nd, M. R. Hoover; 3rd, A. W. E. Hellyer.

MINORCAS.

Males, 6—1st, L. V. Zavitz; 2nd, R. L. Wheadon; 3rd, J. M. Peaker.
Females, 7—1st, E. R. Frith; 2nd, L. V. Zavitz; 3rd, R. L. Wheadon.

LEGHORNS.

Males, 10—1st and 2nd, Donald McKellar; 3rd, M. R. Hoover.
Females, 9—1st, James Snetsinger; 2nd, D. McKellar; 3rd, J. I. Gill.

FRENCH.

Males, 3—1st, J. H. Warrington; 2nd, G. & J. Bogue; 3rd, Geo. Robertson.
Females, 3—1st, J. H. Warrington; 2nd, G. & J. Bogue; 3rd, Geo. Robertson.

DRESSED POULTRY.

Pair Brahmas or Cochins, Any Variety, 4

1st and 3rd, A. A. Armstrong; 2nd, Chas. LaRose.

Pair Javas, Langshans or Rhode Island Reds, 2.

1st, W. H. Slinn; 2nd, Joseph Tomalin.

Pair Plymouth Rocks, 10

1st, Joseph Tomalin; 2nd, A. A. Armstrong; 3rd, Alex. Dynes

Pair Wyandottes, 10.

1st and 2nd, G. Higman, Sr.; 3rd, A. A. Armstrong.

Pair Minorcas, Andalusians, or Leghorns, 5.

1st, Joseph Tomalin; 2nd, A. A. Armstrong; 3rd, W. H. Slinn.

Pair Orpingtons, 8.

1st, Joseph Tomalin; 2nd and 3rd, W. H. Slinn.

Pair Games, 1.

1st, Chas. LaRose.

Pair French, 1.

1st, W. H. Slinn.

Best Pair Fowls.

1st, Joseph Tomalin.

Turkey, Any Age, Male, 2.

1st, Joseph Tomalin; 2nd, Jas. Snetsinger.

Turkey, Any Age, Female, 3.

1st, Joseph Tomalin; 2nd and 3rd, James Snetsinger.

Turkey, 1908, Male, 4.

1st, James Snetsinger; 2nd, Joseph Tomalin; 3rd, George R. Bradley.

Turkey, 1908, Female, 4.

1st, Geo. R. Bradley, 2nd and 3rd, James Snetsinger.

Geese, 1908, White, 2.

1st, Joseph Tomalin; 2nd, A. Thompson.

Geese, 1908, Colored, 5.

1st, Jas. Snetsinger; 2nd and 3rd, A. Thompson.

Pair Ducks, 1908, White, 3.

1st, A. Thompson: 2nd, Joseph Tomalin; 3rd, Jas. Snetsinger.

Pair Ducks, 1908, Colored, 3.

1st and 3rd, Jos. Tomalin; 2nd, A. Thompson.

Dozen Colored Eggs, 2.

1st, Geo. R. Bradley: 2nd, W. H. Slinn.

Pair Squabs, 7.

1st, 2nd, and 3rd, C. H. Currier.

POULTRY SPECIALS.

Light Brahmas—Best cock, H. W. Partlo; best cock, hen, cockerel and pullet, H. W. Partlo.

Brahmas—Best collection, H. W. Partlo.

Cochins—Best collection, R. Oke.

Barred Plymouth Rocks—Best cock, John Pringle; best hen, F. A. James; best cockerel. John A. Lambertus; best pullet, John Pringle; best cock, hen, cockerel and pullet, John Pringle; best collection, John Pringle.

White Plymouth Rocks—Best male, Geo. Robertson; best female, George Robertson. Whitest bird, Geo. Robertson, best cock, hen, cockerel and pullet, Geo. Robertson.

Buff Plymouth Rocks—Best collection, Hintonburg Poultry Yards.

Plymouth Rocks, Except Barred—Best cock hen, cockerel and pullet, Hintonburg Poultry Yards.

Plymouth Rocks—Best cock, hen, cockerel and pullet, Hintonburg Poultry Yards.

Golden Wyandottes—Best collection, J. H. Magill.

Silver Wyandottes—Best collection, Hintonburg Poultry Yards.

Buff Wyandottes—Best cockerel, Tooker & Bowey.

White Wyandottes—Best cock, Jos. Russell; Best Hen—Joseph Russell; best cockerel, Highland Park Poultry Yards; best pullets, Highland Park Poultry Yards; best cock and hen, Joseph Russell; best cock, hen, cockerel and pullet, Joseph Russel.

Partridge Wyandottes—Best young pair, Geo. Higman, Jr.; best collection, J. E. Fidler.

Columbian Wyandottes—best collection, E. R. Frith.

Wyandottes—Best cock, hen, cockerel and pullet, G. & J. Bogue.

Wyandottes, Except White—Best cock, hen, cockerel and pullet, Hintonburg Poultry Yards.

Javas—Best collection, G. & J. Bogue.

R. C. Rhode Island Reds—Best collection, Hintonburg Poultry Yards.

S. C. Rhode Island Reds—Best collection, Wheadon & Pearson.

Rhode Island Reds—Best cock, hen, cockerel and pullet, Hintonburg Poultry Yards.

Duckwing Games—Best cock, hen, cockerel and pullet W. Barber.

Old English or Pit Games—Best cock, hen, cockerel and pullet, E. H. Benjamin.

Any Standard Variety Games—Best cock, hen, cockerel and pullet, W. Barber.

S. C. White Leghorns—Best cock, James L. McCormick; best hen, James L. McCormick; best cockerel, Jas. L. McCormick; 2nd best cockerel, W. H. Carleton; 3rd best cockerel, F. Wales; best pullet, W. H. Carleton; 2nd, best pullet, Donald McKellar; 3rd, best pullet, W. H. Carleton; best cock, hen, cockerel and pullet, Jas. L. McCormick.

S. C. Brown Leghorns—Best collection, G. H. A. Collins.

S. C. Black Leghorns—Best female, Geo. Robertson; best cockerel, W. N. Osborne; best collection, W. M. Osborne.

Leghorns, Except S. C. White—Best cock, hen, cockerel and pullet, George Robertson.

Leghorns—Best cock, cockerel and pullet, Jas. L. McCormick.

Spanish—Best black cock, G. & J. Bogue; best male, G. & J. Bogue; best female, J. H. Warrington.

Black Minorcas—Best collection, L. V. Zavitz.

Minorcas—Best male, L. V. Zavitz; best female, L. V. Zavitz; best cock, hen, cockerel and pullet, A. C. Moyer.

S. C. Buff Orpingtons—Best cock, A. W. E. Hellyer.

Buff Orpingtons—Best cock, A. W. E. Hellyer; best hen, A. W. E. Hellyer; best cockerel, A. W. E. Hellyer; best pullet, A. W. E. Hellyer; best male, A. W. E. Hellyer; best collection, A. W. E. Helyer; best cock, hen, cockerel and pullet, A. W. E. Hellyer.

White Orpingtons—Best male, Jas. Snetsinger; best female, Jas. Snetsinger; best collection, Jas. Snetsinger.

A. O. V. Orpingtons—Best male, Hamilton & Scoyne; best female, Hintonburg Poultry Yards; best collection, Hamilton & Scoyne.

Orpingtons, Except Buff—Best cock, hen, cockerel and pullet, Jas. Snetsinger.

Silver Grey Dorkings—Best collection, McDougall & Bedlow.

Colored Dorkings—Best collection, J. H. Warrington.

White Dorkings—Best collection, J. H. Warrington.

Houdans—Best collection, G. & J. Bogue.

Any Variety French, Except Houdans—Best collection, G. & J. Bogue.

French—Best male, G. & J. Bogue, best female, G. & J. Bogue.

Hamburgs—Best male, R. Oke; best female, H. Baptie, best collection, any one variety, R. Oke.

Polands—Best male, Wm. McNeil, best female, Wm. McNeil.

Best Collection, Any One Variety—Wm. McNeil.

A. O. S. V. Fowls—Best male, G. & J. Bogue; best female, G. & J. Bogue.

Old English Game Bantams Spangled—Best cock and hen, P. E. Aird.

Game Bantams—Best collection, Rook Bros.; best cock, hen, cockerel and pullet, Rook Bros.; best shaped male in pyle, brown, red or duckwings, Mutchmore & Co.

Cochin Bantams—Best collection, any variety, Wheadon & Pearson.

Bantams, Other than Game—Best cock, hen, cockerel and pullet, Wheadon & Pearson.

Bantams—Best male, R. Oke; best female, R. Oke.

Turkeys—Best collection, any variety, A. Thompson.

Geese—Best collection, any variety, A. Thompson.

Rouen Ducks—Best young drake, Baker Bros.

Cayuga Ducks—Best young drake, Baker Bros.

Ducks—Best collection, any variety, G. & J. Bogue.

PIGEONS.

Best Blue Pouter Cock—John A. Belford.

Best Pair Red-Bearded L. F., C. L. Tumblers—Hiawatha Pigeon Lofts.

Best Pair of Silver Dun Antwerps—W. H. Reid.

Best Black Barb Cock—C. H. Currier.

Best Blue Pouter Hen—J. H. Magill.

Best Pair Black Barbs—C. H. Currier.

Best White Jacobin—C. H. Currier.

Best Black Jacobin—W. H. Reid.

Best Black Magpie—Mutchmore & Co.

Best Yellow Magpie—Mutchmore & Co.

Best Blue-Chequered Homer—John A. Belford.

Best Blue Homer—R. E. Blakeley.

Best Collection of Trumpeters, Jacobins, or Dragoons—W. H. Reid.

GENERAL SPECIALS.

Best Three Dressed Cockerels or Pullets, Incubator Hatched—A. W. E. Hellyer.

Best Cock, Hen, Cockerel and Pullet of Utility Breed—H. W. Partlo.

Best Bird in Show—John Pringle.

Whitest Bird in Show—George Robertson.

MEMBERS OF DOMINION CATTLE BREEDERS' ASSOCIATION. 1908 AND 1909.

Name and Address.	Breed.
Abbot, Fred., Harrietsville	Holstein-Friesian.
Adams, E. D., Calgary, Alta	Galloway.
Adamson, Edgar, Erindale	Holstein-Friesian.
Archer, T. J., Warwick	Hereford.
Armstrong, Hugh, Rosemont	Hereford.
Armstrong, M., Tilsonburg.	Holstein-Friesian.
Bailey, W. J., Nober	Holstein-Friesian.
Bald, Wm. J., Sebringville	Holstein-Friesian.
Baldwin, Geo. A., Dunnville	Holstein-Friesian.
Bales, O. D., Lansing	Holstein-Friesian.
Ballantyne, W. W., Stratford	Ayrshire.
Barber, Frank, Villa Nova	Holstein-Friesian.
Barnett, Robert, Curries	Holstein-Friesian.
Barr, B. R., Harrietsville	Holstein-Friesian.
Barton, John H., Vankleek Hill	Ayrshire.
Bedgood, Thos. E., McWilliams	Holstein-Friesian.
Begg, James, Box 88, St. Thomas	Ayrshire.
Begg, Victor, Moose Creek	Ayrshire.
Bell, Wm., V.S., Vars	Ayrshire.
Bennett, Walter, Chatham	Hereford.
Benning, J., Williamstown	Ayrshire.
Binnie, Jas., Erin	Aberdeen-Angus.
Blayney, J. E., Lynnville	Holstein-Friesian.
Bogart, J. W., Morewood.	Ayrshire.
Bollert, H., Cassel	Holstein-Friesian.
Bowley, Walter W., Napperton	Ayrshire.
Bowman, Jas., Guelph	Aberdeen-Angus.
Bowyer, C. W., Carholme	Holstein-Friesian.
Boyd, Mossom & Co., Bobcaygeon	Hereford.
Boyd, N., Carberry, Man.	Galloway.
Broadfoot, T. D., Fergus	Aberdeen-Angus.
Brock, R. B., Jarvis	Holstein-Friesian.
Brown, John, Oxford Centre	Holstein-Friesian.
Brown, John C., Stamford	Holstein-Friesian.
Bryant, Wm. A., Cairngorm	Holstein-Friesian,
Buchanan, John, Elia	Holstein-Friesian.
Buckrell, John, Beaconsfield	Holstein-Friesian.
Burt, D., St. George	Holstein-Friesian.
Burt, J. W., Coningsby	Aberdeen-Angus.
Buskin, Wesley, Flesherton	Hereford.
Butler, Edwin, Norwich	Holstein-Friesian.

Name and Address.	Breed.
Callender, James, North Gower	Ayrshire.
Campbell, John, Dalmeny	Ayrshire.
Campbell, John, Vankleek Hill	Ayrshire.
Carlisle, G. F., Newton Brook	Holstein-Friesian.
Caughell, David, Yarmouth Centre	Holstein-Friesian.
Caughell, G. H., Middlemarch	Holstein-Friesian.
Central Experimental Farm, Ottawa.	Ayrshire.
Chambers, Edwin C., Fairfield Plains	Holstein-Friesian.
Christie, Peter, Manchester	Shorthorns.
Clare, Herbert, Norwich	Holstein-Friesian.
Clarke, Alex., Brimston's Corners	Ayrshire.
Clarke, R. C. & Co., Hammond	Ayrshire.
Clarke, Wm., Myersburg	Ayrshire.
Clarke, Wm. H., Summerlea	Ayrshire.
Clarke, Harry, Schomberg	Hereford.
Clarkson, John, Summerville	Holstein-Friesian.
Clemons, G. W., St. George	Holstein-Friesian.
Clifford, L. O., Oshawa	Hereford.
Cline, John W., Boston	Holstein-Friesian.
Clute, Justice R. C., Toronto	Ayrshire.
Cohoe, D. B., New Durham	Holstein-Friesian.
Cohoe, D. P., New Durham	Holstein-Friesian.
Cohoe, J. W., New Durham	Holstein-Friesian.
Cohoon, Emerson, Harrietsville	Ayrshire.
Coke, J., Erin	Aberdeen-Angus.
Colbeck, Thos., Grand Valley	Hereford.
Comfort, Alvin M., Elcho	Ayrshire.
Cook, B. G., Ingersoll	Holstein-Friesian.
Cudmore, Chas., Sprucedale	Hereford.
Cryderman, F. S., Osnabruck Centre	Ayrshire.
Cumberland, Barlow, Port Hope	Ayrshire.
Cumming, A. J., Heckston	Ayrshire.
Cumming, Donald, Lancaster	Ayrshire.
Darrach, E. J., Pendleton	Ayrshire.
Davis, Geo. & Sons, Alton	Aberdeen-Angus.
Death, Geo. T., Dixie	Holstein-Friesian.
Deeks, John, Dunbar	Ayrshire.
Dennis, Edgar, Newmarket	Holstein-Friesian.
Dent, T. H., Woodstock	Holstein-Friesian.
Denyes, H. J., Foxboro	Ayrshire.
Dingwell, James, Williamstown	Ayrshire.

MEMBERS OF THE DOMINION CATTLE BREEDERS' ASSOCIATION, 1908 AND 1909.—*Continued.*

NAME AND ADDRESS.	BREED.
Doring, F. L. A., Clarence	Ayrshire.
Douglas, Jas., Caledonia	Shorthorn.
Duff, John, Rockwood	Galloway.
Dunkin, T. L., Norwich	Holstein-Friesian.
Dunn, Andrew, Ingersoll	Holstein-Friesian.
Dyment, N., Clappison's Corners	Ayrshires.
Dyment, S., Barrie	Shorthorn.
Eadie, A. G., Vars	Ayrshire.
Eastman, John W., Russell	Ayrshire.
Ede, P. D., Oxford Centre	Holstein-Friesian.
Edmondson, Chris., Brantford	Holstein-Friesian.
Elliott, Geo. S., Tillsonburg	Holstein-Friesian.
Elliott, W. F., Coleman	Holstein-Friesian.
Emmett, C. D., South End	Holstein-Friesian.
Empey, Adam, Springfield	Ayrshire.
Fairbairn, T., Billing's Bridge	Ayrshire.
Farlinger, W. K., Morrisburg	Ayrshire.
Ferguson, Fred. S., Inverary	Holstein-Friesian.
Ferguson, Geo. A., Tillsonburg	Holstein-Friesian.
Ferguson, John, Camlachie	Ayrshire.
Fierheller, C. D., Mount Elgin	Holstein-Friesian.
Fierheller, E. E., Mount Elgin	Holstein-Friesian.
File, Dr. A. J., Ameliasburg	Ayrshire.
Fisher, M. Vicars, Glanworth	Holstein-Friesian.
Flatt, D. C., Millgrove	Holstein-Friesian.
Flatt, John I., Millgrove	Holstein-Friesian.
Fleming, Henry, Craigleith	Hereford.
Forester, M. A. S., Oakville	Aberdeen-Angus.
Forget, Rev. J. W., Russell	Ayrshire.
Fraser, Mrs. Agnes, Weston	Holstein-Friesian.
Fyles, F. F., Abercorn	Ayrshire.
Gardhouse, John, Highfield	Shorthorn.
Gies, C. R., Heidelburg	Holstein-Friesian.
Gilbert, H. J., Dereham Centre	Holstein-Friesian.
Gillies, Wm., Robb	Hereford.
Gilmen Bros., Rossmere	Ayrshire.
Gilroy, Jos., Lyn	Ayrshire.
Gleason, Reuben, Medina	Holstein-Friesian.
Gregg, F. H., Salford	Holstein-Frieaian.
Griffin, F. J., Burgessville	Holstein-Friesian.
Groat, Charles, Brooklin	Shorthorn.

NAME AND ADDRESS.	BREED.
Guy, F. T., Darlington	Ayrshire.
Haley, M. H., Springford	Holstein-Friesian.
Haley, M. L., Springford	Holstein-Friesian.
Hall, Walter, Washington	Aberdeen-Angus.
Hallman, A. C., Breslau	Holstein-Friesian.
Hamill, H. C., Islay	Ayrshire.
Hamilton, Richard, Rosemere	Ayrshire.
Hanmer, E. E., Norwich	Holstein-Friesian.
Hanmer, Willoughby, New Durham	Holstein-Friesian.
Harris, Frank, Mount Albert	Ayrshire.
Harrison, W. H., Mount Albert	Hereford.
Harrison, Frank, Mount Albert	Hereford.
Harrison, Geo., Kincardine	Holstein-Friesian.
Harrison, Jas. E., Kincardine	Holstein-Friesian.
Harrison, Josh., York Mills	Holstein-Friesian.
Hartley, Miles, Norwich	Holstein-Friesian.
Hartley, Stephen, New Durham	Holstein.Friesian.
Hartley, Thomas, Downsview	Holstein-Friesian.
Hartley, W. A., New Durham	Holstein-Friesian.
Heeney, Fred. V., Ingersoll	Holstein-Friesian.
Hendy, Chas., Campbellford	Ayrshire.
Hensman, W. G., Essex	Ayrshire.
Herbst, Geo., Alsfeldt	Holstein-Friesian.
Herron, J. H., Courtland	Holstein-Friesian.
Hicks, R. F., Newtonbrook	Holstein-Friesian.
High, Isaac W., South Cayuga	Holstein-Friesian.
Hill, Jas. J., Speedside	Hereford.
Hill, J. W., St. Thomas	Holstein-Friesian.
Holtby, Benj., Belmont	Holstein-Friesian.
Homer-Dixon, Mrs., Niagara Falls South	Ayrshire.
Hulet, A. E., Norwich	Holstein-Friesian.
Hume, A. & Co., Menie	Ayrshire.
Hunt, B. J., Ottawa South	Ayrshire.
Hunt, John, Russell	Ayrshire.
Hunter, A. S., Durham	Hereford.
Hunter, J. J., Durham	Hereford.
Hunter, Robert, Sr., Maxville	Ayrshire.
Hunter, R. R., Maxville	Ayrshire.
Hunter, Wm., Maxville	Ayrshire.
Hunter, W. H., The Maples	Hereford.
Immerson, C. J., Lyn	Ayrshire.

Irwin, H. D., Markdale	Galloway.
James, D. A., Nilestown	Ayrshire.
Jardin, David S., Nelson	Holstein-Friesian.
Jickling, J. B., Carman, Man	Galloway.
Jerome, Holbert, Glanford	Holstein-Friesian.
Johnson, Wm. H., Avon	Holstein-Friesian.
Jull, Geo., Ranelagh	Holstein-Friesian.
Kains, Alfred, Byron	Ayrshire.
Kellington, John, Ravenshoe	Shorthorn.
Kelly, Byron, Kelvin	Holstein-Friesian.
Kelly, Arthur, Vanessa	Holstein-Friesian.
Kelly, R. J., Hagersville	Holstein-Friesian.
Kemp, Albert, Forest	Hereford.
Kennedy, A., Ayr	Holstein-Friesian.
Kennedy, Archie & Sons, Vernon	Ayrshire.
Ketchen, Geo. A., Wallbridge	Ayrshire.
Kinsey, James, Doon	Ayrshire.
Kitchen, D. D., Renton	Holstein-Friesian.
Kitchen, Frederick D., Renton	Holstein-Friesian.
Kitchen, S. G., St. George	Holstein-Friesian.
Knight, Joshua, Elginburg	Ayrshire.
Laidlaw, E. W. H., Aylmer	Holstein-Friesian.
Laidlaw, Geo. A., Aylmer	Holstein-Friesian.
Laidlaw, Lloyd K., Aylmer	Holstein-Friesian.
Lambkin, W. L., Fordwich	Holstein-Friesian.
Lear, F. L., Orland	Ayrshire.
Lee, J. W., Simcoe	Holstein-Friesian.
Lee, R. S., Williamsford	Hereford.
Leeson, F., Aylmer	Holstein-Friesian.
Leeson, Geo. M., Varney	Hereford.
Leitch, D., Cornwall	Ayrshire.
Lemon, Samuel, Lynden	Holstein-Friesian.
Lester, H. A., Burford	Holstein-Friesian.
Livingstone, Isabella, Grimsby	Ayrshire.
Locke, John, Campbellford	Ayrshire.
Lorch, Albert, Elmira	Holstein-Friesian.
Loveless, R. M., Agincourt	Holstein-Friesian.
Lovering, J. A., Lovering	Hereford.
Low, John, Elora	Aberdeen-Angus.
Mackie, R. J., Oshawa	Hereford.
Macklin, S., Weston	Holstein-Friesian.
Martin, R. B., Elmira	Holstein-Friesian.
Mason, Wm. E., Tyrrell	Holstein-Friesian.
Melick, Aaron, Smithville	Ayrshires.
Michener, Martin, Dunnville	Ayrshire.
Miller, Robert J., Fonthill	Holstein-Friesian.
Mitchell Bros., Norham	Hereford.
Mitchell, Wm., Lancaster	Ayrshires.
Mittlefehldt, A., Elcho	Holstein-Friesian.
Mittlefehldt, J. H., Elcho	Holstein-Friesian.
Mode, D. G., Vankleek Hill	Ayrshires.
Montmorency, Geo. de., Woodstock	Holstein-Friesian.
Moore, Benj. L., Burgessville	Holstein-Friesian.
Moore, Sam D., New Dublin	Ayrshire.
Motheral, James, Drumbo	Holstein-Friesian.
Moynihan, J., Don	Holstein-Friesian.
Murray, B. J., Martintown	Ayrshire.
McCaskill, Alex., Barb	Ayrshire.
McConkey, R. J., Stroud	Hereford.
McConnell, Ross, Luton	Ayrshire.
McCormick, Chas. R., Ratho	Holstein-Friesian.
McCrae, David, Guelph	Galloway.
McCubbin, John, Warkworth	Ayrshire.
McDonald, F. E., Picton	Ayrshire.
McDowell, M., Norwich	Holstein-Friesian.
McEwing, A. W., Harlock	Aberdeen-Angus.
McFarland, G. A., Preston Vales	Ayrshire.
McGhee, S. J., Beachville	Holstein-Friesian.
McGhee, Robert, Beachville	Holstein-Friesian.
McInnis, J. D., Glenpayne	Ayrshire.
McIntosh, Peter, Cass Bridge	Ayrshire.
McIntyre, Wm., Newington	Ayrshire.
McKee, H. & J., Norwich	Ayrshire.
McKenzie, Angus, Vankleek Hill	Ayrshire.
McKenzie, John, Willowdale	Holstein-Friesian.
McKenzie, G. H., Thornhill	Holstein-Friesian.
McKinnon, A., Hillsburg	Aberdeen-Angus.
McKinnon, R. W., Coningsby	Aberdeen-Angus.
McKinny, Alex., Erin	Aberdeen-Angus.
McLaren, P. S., McGarry	Ayrshire.
McLean, W. J., Elm Grove	Hereford.
McLennan, John, Laggan	Ayrshire.
McLeod, W. L., Kirkhill	Ayrshire.
McLeod, John D., Moose Creek	Ayrshire.
McLoud, James, Plainville	Aberdeen-Angus.
McMaster, J. A., Summertown	Ayrshire.
McMannus, J. P. & C., Enterprise	Ayrshire.
McMillan Bros., Dunbar	Ayrshire.
McMillan, D. E., Laggan	Ayrshire.
McQueen, T. W., Tillsonburg	Holstein-Friesian.

MEMBERS OF THE DOMINION CATTLE BREEDERS' ASSOCIATION 1908 AND 1909.—*Concluded.*

Name and Address.	Breed.
Nelles, Lorne C., Boston	Holstein-Friesian.
Newton, J. L., Chapman	Ayrshire.
Nichols, Ira, Norwich	Holstein-Friesian.
Nixon, Wm. L., Ingersoll	Holstein-Friesian.
Nixon, Howden, Ingersoll	Holstein-Friesian.
North, Geo., Guelph	Holstein-Friesian.
Oliver, Geo., Bright	Holstein-Friesian.
Ontario Agricultural College, Guelph	Hereford, Ayrshires.
O'Neil Bros., Maple Grove	Hereford.
Owens, S. W., Antrim	Ayrshire.
Pallett, Geo. Wm., Summerville	Holstein-Friesian.
Palmer, B. J., New Durham	Holstein-Friesian.
Palmer, Geo. R., Summertown	Ayrshire.
Parks, Thos. J., Orangeville	Hereford.
Paterson, T. G., Rayside	Holstein-Friesian.
Patten, Walter, St. George	Holstein-Friesian.
Peacock, Grace E., Mt. Salem	Holstein-Friesian.
Pearce, Arthur, Cornell,	Holstein-Friesian.
Pearce, Thos., Cornell	Holstein-Friesian.
Pearce, W. M., Tillsonburg	Holstein-Friesian.
Penhall, R. A., St. Thomas	Holstein-Friesian.
Percival, G. W., Glen Buell	Ayrshire.
Pettit, F. E., Burgessville	Holstein-Friesian.
Poole, Chauncey, Norwich	Holstein-Friesian.
Poole, Samuel, Norwich	Holstein-Friesian.
Pound, Wm. F., Bayham	Holstein-Friesian.
Prouse, G. T., Ostrander	Holstein-Friesian.
Prouse, Wm., Dereham Centre	Holstein-Friesian.
Prouse, Thos., Dereham Centre	Holstein-Friesian.
Rennie, Wm., Menie	Ayrshire.
Reed, H., Mimosa	Hereford.
Reid, Wm., Murillo	Ayrshire.
Reid, H. J., Epping	Hereford.
Rettie, Jas., Norwich	Holstein-Friesian.
Rice, Geo., Tillsonburg	Ayrshire.
Richardson, J. W., Caledonia	Holstein-Friesian.
Richardson, Matt., Caledonia	Holstein-Friesian.
Rife, David, Hespeler	Holstein-Friesian.
Rife, Wm. A., Hespeler	Holstein-Friesian.
Ritchie, W. L., Saurin	Hereford.
Rivers, Walburn, Foldens	Holstein-Friesian.
Robbins, Collver V., Wellandport	Holstein-Friesian.
Robertson, David, M.D., Milton	Holstein-Friesian.
Robinson, A. E., Markham	Holstein-Friesian.
Roblin, W. H. C., Ameliasburg	Ayrshire.
Robson, John G., Ilderton	Shorthorn.
Rogers, A. S., Sparta	Holstein-Friesian.
Row, Fred., Curries	Holstein-Friesian.
Sandilands, John, Williamstown	Ayrshire.
Schell, Walter S., Woodstock	Holstein-Friesian.
Schiefele, A. W., Heidelberg	Holstein-Friesian.
Sexsmith, M. W., Ridgeway	Ayrshire.
Shaffner, F. L., Boissevain, Man	Galloway.
Shannon Bros., Arnprior	Hereford.
Sharp, Jas., Rockside	Aberdeen-Angus.
Shaw, Robert, Brantford	Galloway.
Shearer, Wm. S., Listowel	Holstein-Friesian.
Shellington, Robert, Harley	Holstein-Friesian.
Sheriff, W. & G. G., Clarence	Ayrshire.
Shuttleworth, H. P., Ingersoll	Holstein-Friesian.
Sifton, Chas, Cairngorm	Holstein-Friesian.
Simmons, W. H., New Durham	Holstein-Friesian.
Simpson, Jas., South Augusta	Ayrshire.
Sinclair, Thos. B., Brigdon	Holstein-Friesian.
Skippon, Thos., Hyde Park	Hereford.
Slaght, Wm., Bealton	Holstein-Friesian.
Sloper, Wm., Cobourg	Ayrshire.
Smiley, S. H., St. Thomas	Holstein-Friesian.
Smith, A. E., Millgrove	Holstein-Friesian.
Smith, C. E., Scotland	Holstein-Friesian.
Smith, G. W., Dundas	Holstein-Friesian.
Smith, H. D., Hamilton	Hereford.
Smith, Ozra, Tyrrell	Holstein-Friesian.
Smith, Robert, Millgrove	Holstein-Friesian.
Smith, Wm. C., Burgessville	Holstein-Friesian.
Snyder, Elias, Burgessville	Holstein-Friesian.
Somers, John, Rockford	Holstein-Friesian.
Stephens, Byron, Brigden	Holstein-Friesian.
Stewart, Fred., Elfrida	Holstein-Friesian.
Stewart, Jas. A., Menie	Ayrshire.
Stewart, Wm., jr., Menie	Ayrshire.
Stone, Alfred, Guelph	Hereford.

Strobridge, Frank, Thamesford	Holstein-Friesian.
Stroud, Thos., Tillsonburg	Holstein-Friesian.
Stutt, R. W., Forest	Hereford.
Suddaby, Milton, Heckston	Ayrshire.
Suhring, Otto, Sebringville	Holstein-Friesian.
Suhring, Wm., Sebringville	Holstein-Friesian.
Swance, B., Tillsonburg	Holstein-Friesian.
Tackell, Wm., Zenda	Holstein-Friesian.
Tapley, W. F., Norwich	Holstein-Friesian.
Taylor, F. W., Wellman's Corners	Ayrshire.
Taylor, J. H., Scotland	Holstein-Friesian.
Taylor, John J., Cassburn	Ayrshire.
Teeft, Thaddeus N., Smithville	Ayrshire.
Teeple, A. H., Curries	Holstein-Friesian.
Telfer, John B., Milton	Galloway.
Telfer, Thos. G., Ingersoll	Holstein-Friesian.
Thomson, Wm. E., Woodstock	Holstein-Friesian.
Thomson, P. A., Hillsburg	Aberdeen-Angus.
Thorn, W., Lyndoch	Ayrshire.
Tran, W. H., Cedar Grove	Ayrshire.
Treffry, W. J., Hawtrey	Holstein-Friesian.
Usher, Isaac, Queenston	Ayrshire.
Van Patter, J. M., Luton	Holstein-Friesian.
Varco, John, Carlow	Aberdeen-Angus.
Wagler, C., Baden	Holstein-Friesian.
Walker, Chas. E., Norwich	Holstein-Friesian.
Walker, Wm., Carluke	Holstein-Friesian.
Walker, A. T., Beaconsfield	Holstein-Friesian.
Wallace, Oswald, Burgessville	Holstein-Friesian.
Ward, R. G., Springvale	Holstein-Friesian.
Warring, J. Edward, Newark	Holstein-Friesian.
Warnica, Asa., Painswick	Hereford.
Watson, T. & J., Proton Station	Hereford.
Watt, Alex., Lancaster	Ayrshire.
Weaver, Roy H., Norwich	Holstein-Friesian.
Welsh, Henry, Weston	Holstein-Friesian.
White, John S., Forest	Hereford.
Whittaker & Sons, H. J., Williamsburg	Ayrshire.
Williams, Albert, Port Perry	Shorthorn.
Willis, Jr., R., Aylmer	Holstein-Friesian.
Willson, E. P., Willsonville	Holstein-Friesian.
Wilson, J. Lockie, Toronto	Ayrshire.
Wood, Tig, Mitchell	Holstein-Friesian.
Woodley, Fred. V., Boston	Holstein-Friesian.
Woodley, Elmer V., Waterford	Holstein-Friesian.
Woods, John G., New Hamburg	Holstein-Friesian.
Woodley, Geo. L., Villa Nova	Holstein-Friesian.
Wright, H. D., Canora, Sask	Galloway.
Wyckoff, D. J., Norwich	Holstein-Friesian.
Wyckoff, I. G., Tyrrell	Holstein-Friesian.
Yates, Philip, Athens	Ayrshire.
Yates, Mahlon, Athens	Ayrshire.
Young, Samuel, Guelph	Aberdeen-Angus.
Zoeller, A. M., New Hamburg	Holstein-Friesian.

MEMBERS OF DOMINION SHEEP BREEDERS' ASSOCIATION, 1908 AND 1909.

Allan, John, Orillia	Leicester.
Allin Bros., Newcastle	Leicester.
Allison, Geo., Burnbank, Man	Leicester.
Alton, J. B., Milton	Leicester.
Andrews, Geo., Millfield, Que	Leicester.
Arkell, Henry & Son, Arkell	Oxford Down.
Armstrong, Jas., Shawville, Que	Oxford Down.
Armstrong W. A., Shawville, Que	Leicester.
Arthur, Fred A., Knowlton, Que	Leicester.
Aulesbrook, Wm., Paris	Shropshire.
Bagshaw, W. A., Uxbridge	Cotswold.
Baker, G. W. A., Oakville	Dorset.
Baker, Geo., Simcoe	Southdown.
Baker & Sons, J. E., Barronsfield, N.S.	Oxford Down.
Barber, John, Salem	———.
Barnett, Wm., Living Springs	Oxford Down.
Barr, John, Blyth	———.
Bater Bros., Trafalgar	———.
Baxter, David, North Georgetown, Que	Leicester.
Beattie, Wm. J., Lemesurier, Que	Leicester.
Beaudoin, P. A., Montreal, Que	Oxford Down.
Bellemare, Adrien, Yamachiche, Que	Leicester.
Bellerose, Dephis, St. Elizabeth, Que	Cotswold.
Bennett, D., Edenville	Shropshire.
Bergerson, Arthur, St. Pie, Que	Leicester.
Biggs, F. C., West Flamboro	Hampshire.
Boswell, A. H., Marshfield, P.E.I	Oxford Down.
Boutet, James, Victoriaville, Que	Leicester.
Bourassa, Theo., Yamachiche, Que	Leicester.
Bowman, James, Guelph	Suffolk, Dorset.

MEMBERS OF DOMINION SHEEP BREEDERS' ASSOCIATION FOR 1908 AND 1909.—*Continued.*

Name and Address.	Breed.
Brien, E. & Son, Ridgetown	Cotswold.
Brisson, T., Warwick, Que	Leicester.
Brown, David, St. Joachim, Que	Leicester.
Bryson, James, Brysonville, Que	Leicester.
Camirand, Louis, Point-du-Lac, Que	Leicester.
Campbell, P. M., Balderson	Oxford Down.
Campbell, John, Woodville	Shropshire.
Campbell, Julien, Stanbridge Sta., Que	———.
Campbell, Peter J., Breadalbane	Leicester.
Cavan, G. W., Box 1052, Toronto	Southdown.
Central Experimental Farm, Ottawa	Shropshire, Dorset.
Cerswell, J. A., Bond Head	Oxford Down.
Chartier, Albert, St. Paul l'Ermite, Que	Oxford Down.
Chretien, J. Bte., Bennet, Que	———.
Christie, Peter, Manchester	Shropshire.
Cleland, Jas. R., Genoa, Que	Leicester.
Cloutier, N., Banlier, de Trois Rivieres, Que	Leicester.
Cloutier, Jos., Riviere Aux Chiens, Que	Leicester.
Colson, John, Hornby	———.
Connell, Tim, Vine	Cotswold.
Cote, Samuel, Rimouski, Que	———.
Cottrelle, G. R., Toronto	———.
Cousins, John & Son, Harriston	Oxford Down.
Coutee, Pierre, St. Felix de Valois, Que	Cotswold.
Couture, Frs., St. Augustine, Que	Leicester.
Couture, Jos., Lorette, Que	Leicester.
Creighton, Robert, Genoa, Que	———.
Dauphin, Felix, St. Elizabeth, Que	Cotswold.
Denis, Arsene, St. Norbert, Berthier, Que	Shropshire, Lincoln, Cotswold and Leicester.
Dillon, Jacob, Ellisville	Shropshire.
Douglas, James, Caledonia	Leicester.
Dominion Experimental Farm, Nappan, N.S.	Leicester.
Drummond, Sir Geo., Beaconsfield, Que	Southdown.
Dryden, Wm., Brooklin	Shropshire.
Drysdale, Thos., Allan's Corners, Que	Leicester.
Dunn, J. A., Wooler	Cotswold.
Dufour, Gideon, Dufour, Que	Leicester.
Duprie, Wilfred, Vercheres, Que	Leicester.
Durham, W. H., Box 1052, Toronto	———.
Easton, Abram, Appleby	Leicester.
Edwards, Geo. B., Covey Hill, Que	Leicester.
Enke, Max., Galiano Island, B.C	Shropshire.
Evans, D. & Son, Somenos, B.C	Southdown.
Fitch, J. P., Oriel	Cotswold.
Fontaine, F., Notre Dame de Stanbridge, Que	Leicester.
Ford, W. H., Dutton	Lincoln.
Fortin, Jos. C., Baie St. Paul, Que	Leicester.
Fortier, Paul, St. Pierre, Baptiste, Que	———.
Foster, A. S., Oakville	———.
Frank, R. W., Kingsbury, Que	Leicester.
Freak, E. J., Walton, N.Y	———.
Frechette, Jos., St. Felix de Valois, Que	Cotswold.
Gamley, A. D., Griswold, Man	Leicester.
Garbutt, R. J., Belleville	Leicester.
Garceau, Gideon, Point-du-Lac, Que	Leicester.
Garceau, Phil., Point-du-Lac, Que	Leicester.
Gardhouse, J. M. & Sons, Highfield	Leicester.
Gareau, J. J., St. Roch l'Achigan, Que	Hampshire.
Genest, Johnny, Victoriaville, Que	———.
George, Allan, Paris	Hampshire.
Gibson, J. T., Denfield	Lincoln.
Gibson, W. H., Beaconsfield, Que	———.
Gilroy, John H., Coe Hill	Cotswold.
Gilroy, Joshua, Lyn	Oxford Down.
Glass, Jas., Roxham, Que	Leicester.
Goodall, Wm., St. Louis de Gonzaque, Que	Leicester.
Gormley, Jas. & Son, Pickering	———.
Gosnell, John S., Highgate	———.
Goucher, Alir., St. Damase, St. Hyacinth, Que	Cotswold.
Gouin, Aime, St. Norbert, Que	Leicester.
Graham, F. J., Brittania Bay	Shropshire.
Grenier, Maxime, Bournival, Que	Leicester.
Grills, Jas., Elora	———.
Guerard, Uldaige, St. Felix de Valois, Que	Cotswold.
Gurney, C. G., Paris	———.
Hall, J. W., Bensfort	Leicester.
Hanmer, J. G., Brantford	Shropshire.
Hanmer, D. G., Burford	Shropshire.
Harding, R. H., Thorndale	Dorset Horns.
Hastings Bros., Crosshill	Leicester.
Herbert, Bernard, St. Constant, Que	Leicester.
Heron, J. A., Billings Bridge	———

Hine, Robert J., Dutton	Oxford Downs.
Hood, G. B., Guelph	Leicester.
Hodgson, C., Brantford	———
Ingram, Thos., Manitowaning	Cotswold.
Innes, Donald, Tobique River, N.B.	Cotswold.
Irving, A., Scotstown, Que	Leicester.
Jackson, John & Son, Abingdon	Southdown.
Jasper, Thos., Harding, Man	Leicester.
Johnston, Peter, Inverness, Que	Leicester.
Johnston Bros., Underwood	Leicester.
Johnston, Wm., Mountain Grove	Leicester.
Kelly, John, Shakespeare	Hampshire, Leicester.
Kemp, C. R., Hazeldean	Oxford.
King, John, H., Smith's Creek, N.B.	Shropshire.
Lachapelle, Napoleon, St. Paul l'Ermite, Que.	Leicester.
Lachapelle, Edeuard, St. Paul l'Ermite, Que.	Leicester, Cotswold.
Lafontaine, Edouard, Plessisville, Que	Leicester.
Lalonde, C., St. Hermas, Que	Leicester.
Lamarche, H., St. Esprit, Que	Leicester.
Lamarche, Ismail, St. Esprit, Que	Leicester.
Lambert, Zepherin, Louisville, Que	Leicester.
Lang, John, Cairnside, Que	Leicester.
Lavallee, Paul, Berthierville, Que	Cotswold.
Lavallee, Louis, St. Guillaume, Que	———
Lavinge, J. P., St. Gertrude, Que	Leicester.
Lee, J. W. & Sons, Simcoe	Oxford.
Legris, Ulderic, St. Leon, Que	Shropshire.
Lemon, S., Kettleby	———
Letourneau, E., Ste. Famille, Ile d'Orleans, Que	Leicester.
Letourneau, Paul Mike, Ste. Famille, Ile d'Orleans, Que	Leicester.
Levert, Nap., St. Benoit, Que	Leicester.
Lloyd-Jones Bros., Burford	Shropshire.
Loiselle, Ovide, St. Maro, Que	———
Lucas, T. A., Bristol Ridge, Que	Leicester.
Lupien, L. E., Louisville, Que	Leicester.
Lyons, S. J., Norval	Cotswold.
Lyster, C. N., Kirkdale, Que	Leicester.
Manitoba Agricultural College, Winnipeg, Man	Leicester.
Manseau, Frs., Nicolet, Que	Leicester.
Martin, E. E., Canning	———
May, John, Melbourne, Que	Leicester.
Mayhew, Orian, Canterbury, Que	Leicester.
Maynard, J. T., Chilliwack, B.C	Dorset.
Miller, Jos., Ephraim, Greenbush	Oxford.
Milne, R. & Son, Green River	Shropshire.
Milot, Hercule, Yamachichi, Que	Oxford.
Milot, Honore, Yamachichi, Que.	Cotswold.
Monkman, W. D., Bond Head	Shropshire.
Morin, P. N., St. Norbert, Que	Leicester.
Morrin, D. T., Lachute, Que	Leicester.
McAllister, W. E., Durham	Leicester.
McCrae, D., Guelph	Southdown & Cotswold.
McCue, Jas. & Son, Melancthon	Leicester.
McDonald, Roderick, Manitowaning	Cotswold.
McEwen, Lt.-Col. R., Byron	Southdown.
McKillican, W. E., Vankleek Hill	Leicester.
McLaren, P. S., McGarry	Oxford.
McLean, A. B., Foam Lake, Sask.	Oxfords.
McLean, Jno. G., Beachburg	Oxiords.
McNally, Hugh, Guelph	———
McPhee, D. A., Vankleek Hill	Oxfords.
McRobie, Fred., Iroquois	Leicester.
Napoleon, Levert, Cote St. Vincent, Que	Leicester.
Napoleon, Rivost, St. Lignois, Que	———
Newton Bros., Clifford	———
Nichol, Robt., Brussels	Leicester.
Nicholls, Jas. H., Dundalk	Leicester.
Noisux, Frederic, St. Cesair, Co. Rouville, Que.	Leicester.
Ouimet, Clovis, St. Francois de Sales, Que.	Lincolns.
Page, T. W., Bolton Glen, Que	Leicester.
Pare, Augustin, Rivier aux Chiens, Que	Leicester.
Park, E. F., Burford	Cotswolds.
Parkinson, Ernest, Eramosa	Lincolns.
Parkinson, L., Eramosa	Lincolns.
Parkinson, G. & W., Eramosa	Leicester.
Parnell, Isaac, Spring Road, Que	Leicester.
Partridge, A. W., Crown Hill	Leicester.
Patrick, J. H., Ilderton	Lincolns.
Pelletier, L. C., Montreal, Que	Oxford Downs.
Peloquin, David, St. Ows, Que	Leicester.
Pepin, Ludger, St. Norbert, Co. Arthabaska, Que	———
Perrault, T., St. Esprit, Que	Cotswolds.
Perrier, Octave, Laprairie, Que	Cotswolds.
Picard, Telephare, St. Theodore d'Acton, Que	Leicester.
Pichette, Donat, St. Esprit, Que	Cotswolds.

MEMBERS OF DOMINION SWINE BREEDERS' ASSOCIATION, 1908 AND 1909.—*Continued.*

Name and Address.	Breed.
Pillus, Jno. H., Knowlton, Que	Leicester.
Potter, A. B., Montgomery, Sask	Leicester.
Provencher, Edouard, St. Norbert, Que	Leicester.
Purcell, Jno., Huntington, Que	Leicester.
Quain, John, Rosedale, Que	Leicester,
Quest, J. & W., Hallerton, Que	Cotswolds.
Rankin, Geo. & Son, Hamiota, Man.	Leicester.
Rawlings, John, Forest	———
Rivet, Avila, Ste. Esprit, Co. Montcalm, Que.	Leicester.
Roberge, J. P., St. Pierre, Ile of Orleans, Que.	Leicester.
Robinson, Chas., Odell Town, Que	Cotswold.
Robson, T. A., Frontier, Que	Leicester.
Ross, Jno., Kinnear's Mills, Que	Leicester.
Roy, James, Bornholm, Ont	———
Rudell, A., Hespeler	Shropshire.
Rutherford, R. N., Glen Morris	———
Rye, Jos. & Sons, Duagh, Alta	Suffolk.
School of Agriculture, La Trappe, Que	———.
Senecal, L. C., St. Marc de Vercheres, Que.	Leicester.
Shaw, Robert, Brantford	Leicester.
Shaw, D. M. & Son, Basinstoke	Leicester,
Shields, A. & A., Caisterville	Sbropshire.
Silver, H. G., Danville, Que	Leicester.
Skinner, F. T., Indian Head, Sask	Shropshire.
Smith, C. E., Scotland	Leicester.
Smith, A. W., Maple Lodge	Leicester.
Smith, W. M., Scotland	Dorsets.
Smith, Wm., Columbus	Cotswold.
Snaden, Miss Annie E., Danville, Que.	———.
Snell, Jas., Clinton	Leicester.
Snell, J. V., Snellgrove	———.
Sockett, John, Rockwood	Cotswold.
Stevens, J. M., Bedford, Que	Leicester.
Stevenson, A., Atwood	Oxford.
Stewart, Alex., Living Springs	Oxford.
Stinson, R. H., Horning's Mills	Cotswold.
Sutton, Mark, Ospringe	Leicester.
Sylvester & Frere, St. Theodore d'Acton, Que	Cotswold.
Sylvester Bros., Clairvoux, Que	Oxford Downs.
Talbot, Evareste, St. Norbert, Co. Arthabaska, Que	———
Telfer, Geo., Paris	South Downs.
Telfer, Bros., Paris	South Downs.
Thompson A., Allen's Corners, Que	Leicester.
Thompson, Douglas, Woodstock	———.
Thouin, Louis, Repentigny, Que	———.
Tolton, Jas. & Son, Walkerton	Oxfords.
Trabon, Edmond, Yamachiche, Que	Oxford Downs.
Tremblay, Achille A., Les Ebouliment, Que	Leicester.
Tracey, Henry, Midhurst	Cotswold.
Trottier, Jos., St. Nobert, Que	———.
Turenne, Dephis, St. Paul l' Ermite, Que	Leicester.
Turenne, Philappe, St. Paul l' Ermite, Que.	Leicester.
Turnbull, Oliver, Walton	Leicester.
Underhill, Jos, Claremont	Shropshires & Cotswold.
Vance, Robert, Ida	Cotswold.
Vilandre, Lewis, St. Victorie, Que	Leicester.
Wallace, Wm. A., Glen Morris.	Shropshires.
Wallace, Thos. J., Kinnear's Mills	Leicester.
Wallace, Jno. N., Renfrew	Shropshires.
Wells, A. C., Sardis, B.C	Lincolns.
Westington & Leon, Plainville	Leicester.
Whitelaw, A. & W., Guelph	Leicester.
Wightman, Robt., Clifford	Leicester.
Williams, H. E., Knowlton, Que	Shropshires.
Wood, C. & E., Freeman	Leicester.
Wood, Wm., Palermo	Leicester.
Wood, E. R., Appleby	Leicester.

MEMBERS OF DOMINION SWINE BREEDERS' ASSOCIATION, 1908 AND 1909.

Abra, Moses, Blair	Yorkshire.
Agricultural College Farm, Truro, N.S.	Yorkshire.
Aldous, R. B., Lorlie, Sask	Yorkshire.
Allison, David, Roland, Man	Berkshire.
Armstrong, David, Quill Lake, Sask	Berkshire.
Armstrong, Henry, Forth, Man	Yorkshire.
Arpin, Eugene, St. Ours (Co. Richelieu) Que.	Yorkshire.
Ash, Wm. R., North Ridge	Berkshire.
Bailey, J. W., Wetaskawin, Alta	Berkshire.
Baker & Vereker, Fort Saskatchewan, Alta.	Yorkshire.
Ballantyne, P. M., Lacombe, Alta	———.
Balsdon, W. A., Whitby	Berkshire.

Banting, T. E. M., Wawanesa, Man	Tamworth.
Barker Bros., Okotoks, Alta	Yorkshire.
Barker, W. S., Deloraine, Man	Yorkshire.
Barr, David, Jr., Renfrew	Yorkshire.
Batchellor, C. A., Bedford, Que	Tamworth.
Beaman, Herman, Napinka, Man	Yorkshire.
Beaudet, Ernest, Lothiniere, Que	Yorkshire.
Beauregar, O. H., St. Damase, Que	Chester White.
Beckstead, G. A., Morrisburg	Berkshire.
Bedlow, John, Brockville	Berkshire.
Beingessner, F. H., Mildmay	Berkshire.
Bell, J. J., Islay, Alta	Yorkshire.
Belton, Thos. H., Hagersville	Yorkshire and Berkshire.
Bennett, Geo., Charing Cross	Chester White.
Bennett, G. Findley, Canterbury, Que	Yorkshire.
Benson, Stephen, Neepawa, Man	Yorkshire.
Bergevin, Eustache, St. Martine, Que	———.
Betzner, Geo. T., Copetown	Yorkshire.
Birch, R., Anderson	Yorkshire.
Bissett, James, Roseland, Man	Berkshire.
Black, D. Allan, Kingston	Yorkshire.
Blackburn, Wm., Murray Bay, Que	Yorkshire.
Blair, Robert, St. Andrews, East Vercheres, Que	Yorkshire.
Blanchet, Etienn, St. Marc, Que	Yorkshire.
Blight, Emerson, Millwood, Man	Berkshire.
Blight, Emerson, Beavelan, Sask	Berkshire.
Boerma, G. North Battleford, Sask	Yorkshire.
Boden, James, Danville, Que	Yorkshire.
Bonnycastle, Chas. E., Campbellford	Berkshire.
Boutet, Jos., Victoriaville, Que	Chester White.
Bowman, Dr. A. E., Amherstburg	Berkshire.
Bowman, T. E., High River, Alta	Berkshire.
Boyle, J. W., Woodstock	Yorkshire.
Boynton, Wm., Dollar, Ont	———.
Brandow, J. L., Walsingham Centre	Yorkshire.
Bray, James, Portage la Prairie, Man	Berkshire.
Bray, John, Logoch, Man	Yorkshire.
Bredt, P. M., Regina, Sask	Yorkshire.
Brethour, J. E. Burford	Yorkshire.
Brien, E. & Son, Ridgetown	Berkshire.
Bright, John, Myrtle Station	Berkshire.
Brodie, Peter, Little York, P.E.I	Berkshire.
Brooks, J. D., Plum Coulee, Man	Poland China.
Brown, F. W., Portage la Prairie, Man	Berkshire.
Brown, John C., Stanford	Tamworth.
Browne Bros., Ellisboro, Sask	Berkshire.
Brownlee, W. J., Bunyan	Yorkshire.
Brownridge, C. M., Arcola, Sask	Yorkshire.
Brownridge, Wm., Ashgrove	Yorkshire and Berkshire.
Bryant, W. A., Cairngorme	Berkshire.
Bull & Son, B. H., Brampton	Berkshire.
Bulstrade, C. G., South Qu'Appelle, Sask	Berkshire.
Burkholder, Noah, Cherrywood	Berkshire.
Caldwell, F. E., Manotick, Ont	Chester White.
Cameron, D. P., Finch, Ont	Yorkshire.
Cameron, J. L., Wilbert, Sask	Berkshire.
Campbell, Geo., Killarney, Man	Tamworth.
Campbell, Jno., Vankleek Hill, Ont	Yorkshire.
Campbell, Mac., Harwich, Ont	Duroc Jersey.
Capes, Henry, Kertch, Ont	Chester White.
Caron, Thodie, St. Aubert, Que	Yorkshire.
Carroll, Thos., Nutana, Sask	Berkshire.
Carswell, E., Penhold, Alta	Yorkshire.
Caswell, A. W., Neepawa, Man	Tamworth.
Caswell, R. W., Saskatoon, Sask	Yorkshire.
Caven, Geo., Box 1052, Toronto	Berkshire.
Central Experimental Farm, Ottawa, Ont	Yorkshire.
Cerswell, J. A., Bond Head, Ont	Yorkshire.
Chapman, F. M., Pickering, Ont	Yorkshire.
Choate, E. T., Brampton, Ont	Berkshire.
Clark, F. W., Christies, N.B	Chester White.
Clark, J. W., Cainsville, Ont	Yorkshire.
Clark, H. G., Georgetown, Ont	———.
Clark, Robert, Ottawa, 41 Cooper St	Chester White.
Clendenning Bros., Harding, Man	Yorkshire.
Coates, Wm., Malton, Ont	———.
Cogswell, Walter S., Centreville, N.B.	Chester White.
Cole, T. J., Bowmanville, Ont	Yorkshire.
College de Saint Laurent, St. Laurent, Que.	Yorkshire.
College de l'Assomption, L'Assomption, Que	Yorkshire.
Collins, P. O., Bowesville, Ont	Yorkshire.
Colvin, James A., Sedgwick, Alberta	———.
Colwell, A. A., Newcastle, Ont	Tamworth.
Cook, W. M., Little York, P.E.I.	———.
Corbett, G. H., Lakeville, Carleton, N.B.	Chester White.
Corbin, Oscar, St. Esprit, Que	———.
Corning, H. W., Chegoggin, N.S	Chester White.
Court, Leonard, Donaldson, P.E.I	Chester White.

MEMBERS OF DOMINION SWINE BREEDERS' ASSOCIATION, 1908 AND 1909. —*Continued.*

Name and Address.	Breed.
Cowan, J. S., Donegal, Ont	Berkshire.
Cowieson, J. B., Queensville, Ont	Berkshire.
Cox, T. A., Brantford, Ont	Berkshire & Yorkshire.
Crockett, Geo., York, P.E.I	Berkshire.
Crowe, John C., Gilbert Plains, Man	Chester White.
Crowell, W. N., Napinka, Man	Berkshire.
Crozier, C. A., Northcote, Ont	Berkshire.
Currie, C., Morriston, Ont	Tamworth & Yorkshire.
Curry, Hugh & Son, Ingleton, Alberta	Berkshire.
Curry, Wm., South Qu'Appelle, Sask	Berkshire.
Dalton, John, Victoria Harbor, Ont	Chester White & Yorkshire.
Davidson, Thos., Spring Valley, Ont	Tamworth.
Davis, H. J., Woodstock, Ont	Yorkshire.
Dawes & Company, Lachine, Que	Berkshire.
DeCourcey, D., Bornholm, Ont	Yorkshire & Chester White.
DeLisle, G., Lloydminster, Sask	Yorkshire.
Demstedt, Abe., Carberry, Man	Yorkshire.
Denis, Arsene, St. Norbert, (Berthier), Que	Yorkshire.
Denison, W. S., Denison's Mills, Que	Chester White.
Department of Agriculture, Edmonton, Alta	Yorkshire.
Derbyshire, C. J., Wheatley, Ont	Duroc Jersey.
Diehl, Wm., Marcelin, Sask	Yorkshire.
Disney, W. F., Greenwood, Ont	Yorkshire.
Dolson, H. A., Alloa, Ont	Berkshire.
Dolson, Samuel, Norval Station, Ont	Berkshire.
Dolson, W. J. McL., Norval Station, Ont	———.
Donaldson, James, Dewittville, Que	Chester White.
Douglas, D. & Son, Mitchell, Ont	Tamworth.
Douglas, Robert, M., Tantallon, Sask	Berkshire.
Duck, R. F. & Son, Port Credit, Ont	Yorkshire.
Dufort, Louis, St. Marc, Que	Berkshire & Yorkshire.
Dulude, Jos., Ste. Martine, Que	Yorkshire.
Durham, John V., Vanessa, Ont	Berkshire.
Durham, W. H., Box 1,052, Toronto	Berkshire.
Duthie, James, Hartney, Man	Berkshire,
Edwards, W. M. V., Souris, Man	Berkshire.
Ellinton, John & Sons, Hornby, Ont	Berkshire.
Elliott, E. N., Wawanessa, Man	Berkshire.
Elliott, W. D., Comber, Ont	Berkshire.
English, W. H., Harding, Man	Yorkshire & Berkshire.
Enke, Max, Galiano Island, B.C	Berkshire.
Erbe, Wm. A., Sussex, N.B	Chester White.
Esty, E. J., Eastman, Que	Yorkshire.
Evans, Wm. H., North Battleford, Sask	Berkshire.
Ewens, J. M., Bethany, Man	Berkshire.
Faith, R. B., Ottawa, Ont	Yorkshire.
Fallis, John A., Redvers, Sask	Yorkshire.
Farough, Nicholas, Maidstone, Ont	Duroc Jersey.
Featherston, Jos. & Son, Streetsville, Ont	Yorkshire.
Ferguson, G. L., Souris, Man	Berkshire.
Fetterley & Son, Martin, Russell, Ont	———.
Field, W. H. & J. O., Vanessa, Ont	Berkshire.
Findlayson, Kenneth, North Battleford, Sask	Yorkshire.
Fisher, A. O., Calgary, Alta., Box 814	———.
Fisher, The Hon. Sidney, Knowlton, Que	Tamworth.
Flatt, D. C. & Son, Millgrove, Ont	Yorkshire.
Fletcher, G. D., Binkham, Ont	Berkshire & Yorkshire.
Fleury, Alfred, Auge Garden, Que	Yorkshire.
Flock, S., Red Willow, Alta	Yorkshire.
Foley, J. A., Ste. Thuribe, Que	Yorkshire.
Forget, R., Baie St., Paul, Que	Yorkshire.
Forth, D. J., Glen Buell, Ont	Yorkshire.
Forrest, H. C., Wardsville, Ont	Berkshire & Yorkshire.
Fortier, Paul, St. Pierre Baptiste, Que	Yorkshire.
Fortin, David, St. Alphonse de Granby, Q	———.
Foster, A. H., Twin Elm, Ont	Yorkshire.
Frazer, J. A., Portage la Prairie, Man	Berkshire.
Gaffield, N. S., Brockville, Ont	Yorkshire.
Garbutt, R. J., Belleville, Ont	Yorkshire.
Garceau, Gedion, Point du lac, Que	Yorkshire.
Garden, Norman, Ellisboro, Sask	Berkshire.
Gaucher, Alex., St. Damase, Que	Chester White.
George, E. D., Putnam, Ont	Chester White.
George, H. E., Crampton, Ont	Chester White.
German, Herbert, St. George, Ont	Tamworth.
Gerry, Idola, Milton East, Que	Yorkshire.
Gibson, Wm. J., Marshfield, P.E.I	Tamworth.
Gies, C. R., Heidelburg, Ont	Poland China.
Glen Bros., Didsbury, Alberta	Yorkshire.
Glenhodson Company, Myrtle, Ont	Yorkshire.
Goodliffe, S. J., Sussex, N.B	Yorkshire.
Gouin, P. A., Three Rivers, Que	Tamworth.
Gourley, Jos., Carp, Ont	Berkshire.

Graham, A., Pomeroy, Man	Yorkshire.
Graham, G. H., Udora, Ont	Yorkshire.
Grantham, John J., Gladstone, Man	Berkshire.
Gregg, W. H., Salford, Ont	Chester White.
Greenshields, J. N., Danville, Que	Yorkshire.
Greenway, Thos., Crystal City, Man	Yorkshire.
Griffiths, D. J., Stanley, N.B	Chester White.
Grimby, Geo. B., Cartwright, Man	Chester White.
Grove, J. L., Ringwood, Ont	Yorkshire.
Gummer, Geo. A., Colbourne, Ont	Chester White.
Gunn, D. & Son, Beaverton, Ont	Yorkshire.
Hadwen, G. H., Duncan's, B.C	Berkshire.
Hallman, A.C., Breslau, Ont	Tamworth.
Hamilton, Jas., Shakespeare, Ont	Berkshire.
Harber, W. W., Camrose, Alta	Yorkshire.
Harding, R. H., Thorndale, Ont	Chester White.
Hardy, Wellington, Roland, Man	Yorkshire.
Harriston, Richard, Coppiac Hill, Alta	Berkshire.
Hastings, Bros., Crosshill, Ont	———.
Hauman, Jos., Fisherville, Ont	Berkshire.
Hauser, Ignatius, Weisenburg, Ont	Yorkshire.
Havens, Thos. N.& Sons, Aldboro, Ont	Yorkshire.
Haw, John, Virden, Man	Berkshire.
Hawkins, R. C., Swan Lake, Man	Berkshire.
Heslop, Arthur, Appleby, Ont	Yorkshire.
Hibbert, F., Cupar, Sask	Berkshire.
Higgins, Geo., Brandon, Man	Yorkshire.
Hillier Bros., Albuna, Ont	Chester White.
Hill, John, Camboro, Ont	Yorkshire.
Hitchcock, Jos. H., Griswold, Man	Yorkshire.
Hogle, S. G., Violet, Ont	Yorkshire.
Holt, Chas. L., Stettler, Alta	Berkshire.
Honey, R., Brickley, Ont	Yorkshire.
Hood, G. B., Guelph, Ont	Yorkshire.
Hoover, Henry H., Horse Lake, Sask	———.
Hope, G. A., Wadena, Sask	Berkshire.
Horn, Peter, Regina, Sask	Yorkshire.
Hoskin, Bertram, The Gully, Ont	Tamworth.
Hostetler, & Sons, New Hamburg, Ont	Yorkshire.
Houston, R., Dixie, Ont	———.
Howes, M. J. & Son, Millett, Alta	Berkshire.
Howlett, Ira L., Keldon, Ont	Yorkshire.
Hume, & Company, Alex., Menie, Ont	Yorkshire.
Hutchison, Lew, Duhamel, Alta	Berkshire.
Hyslop, Robert, Brantford, Ont	Berkshire.
Ingles, W. D., Foster, Que	Yorkshire.
Ings, S. R., Pownal, P.E.I.	Berkshire.
Innes, Donald, Tobique River. N.B	Yorkshire.
Irving, J. D., Buctouche, N.B	Yorkshire & Berkshire.
Irwin, Gilbert, Cameron, Ont.	Yorkshire.
Isaac, D. N., Souris, Man	Berkshire.
Jackman, W. J, East Clover Bar, Alta	Berkshire.
Jackson, John R., Yatton, Ont	Berkshire.
James, Clarence M., Rosser, Man	Yorkshire.
James, Walter & Son, Rosser, Man	Yorkshire.
Jasper, A. F. Harding, Man	Berksnire.
Jasper, Thos., Harding, Man	Berkshire.
Jeffs & Son, E., Bond Head, Ont	Berkshire.
Jewett, John R., Macinquac, N.B.	Chester White.
Johnstou, Bros., Underwood, Ont	Yorkshire.
Johnston, A. W., Prongua, Sask	Berkshire.
Johnston, Wm., Delta, Ont	Berkshire.
Jones, D. Jr., Caledonia, Ont	Yorkshire.
Jones, D., Caledonia, Ont	Yorkshire.
Jones, James, Calgary, Alta	Berkshire.
Jones, Wm., Zenda, Ont	Yorkshire.
Kean, J. & Son, Orillia, Ont	Yorkshire.
Keith & Son, Wm., Listowel, Ont	Tamworth.
Kelly, John & Son, Shakespeare, Ont	Berkshire.
Kelly, J. W., Hagersville, Ont	Yorkshire.
Kelly, R. J., Hagersville, Ont	Tamworth.
Ketchen, D. W., Belleville, Ont	———.
Ketcheson, Mrs. J. H., Chisholm, Ont	Tamworths.
Kettlewell, Gervasse, Davidson, Sask	Yorkshire.
Killough, J. H., Pense, Sask	Yorkshire & Tamworth.
King, Oliver, Wawanessa, Man	Yorkshire.
Kinston, R. J., Oxford Mills, Ont	Yorkshire.
Kirbyson, J. R., Fairfax, Man	Yorkshire.
Knight, Geo. E., Sardis, B.C	Chester White.
Knight, Stephen, Elginburg, Ont	Berkshire.
Koelln, H., Glen Allen, Ont	Yorkshire & Berkshire.
Lachapelle, Louis, St. Pie de Bagot, Que	Chester White.
Lalanne, Pierre, Mount Johnston, Que	Chester White.
Lalime, L., St. Hyacinthe, Que	———.
Langelier, Gus. A., Cap Rouge, Que	Yorkshire.
Larkin, John D., Queenstown, Ont	Berkshire.
Lavallie, Paul, Berthier en Haut, Que	Yorkshire.
Lavallie, Louis, St. Guillaume, Que	Yorkshire.
Lavallie, Pierre, St. Norbert, Que	Yorkshire.
Lawrence, J., Oxford Centre, Ont	Berkshire.

MEMBERS OF DOMINION SWINE BREEDERS' ASSOCIATION, 1908 AND 1909.—*Continued.*

Name and Address.	Breed.
Lea, Richard, Bridge Creek, Man	Berkshire.
Leclere, Jos., St. Charles de Bellechase, Que.	Yorkshire.
Lee, J. W. & Son, Simcoe, Ont	Yorkshire.
Lee, Jos. & Son, Dunham, Que	Chester White.
Lefaivre, P. M., Vankleek Hill, Ont.	Berkshire.
Legris, N., St. Leon, Co. Maskinonge, Que.	Yorkshire.
Lemaire, Jos., St. Majorie, Que	Yorkshire.
Lemon, S., Kettleby, Ont.	Berkshire.
Leonard, Jas. B., Appleby, Ont	Yorkshire.
Letourneau, Eudore, St. Famille, Ile d Orleans, Que	Yorkshire.
Linton, Wm. Jr., Aurora, Ont	Yorkshire.
Little, T. Jr., Kirkwall, Ont	Yorkshire & Berkshire.
Lloyd, Jas. H., St. Lin, Que	Yorkshire.
Logan Bros., Amherst Point, N.S	Berkshire.
Loiselle, Ovide, St. Marc, Que	———.
Loisette, Oriole, St. Marc, Que	———.
Lowden, M. L., Binbrook, Ont	Berkshire.
Loynachan, A. D., Glen Brook, Ont	Yorkshire.
Lucas, Wm., Appleby, Ont	Chester White.
Lyall, Chas. F., Strome, Alta	Berkshire.
Lyons, S. J., Norval, Ont	Berkshire.
Lyon, Wm., Moffat, Sask	Berkshire.
Mabon, W., Neelin, Man	Yorkshire.
Macdonald College, Macdonald College, Que.	Berkshire & Yorkshire.
Main Bros., Glenrose, Sask	Berkshire.
Malott, Gavan, Leamington, Ont	Poland China.
Manitoba Agr. Coll., Winnipeg, Man	Berkshire.
Manseau, Francis, Nicolet, Que	Yorkshire.
Mansfield, Geo., Manotick, Ont	Chester White.
Marcotte, Armand, St. Basil Station, Que.	Yorkshire.
Mark, G. H., Little Britain, Ont	Berkshire.
Markle, D. G., Lamont, Alta	Berkshire.
Marples, J. C., Delean, Man	———.
Martin, E. E., Canning, Ont	Berkshire.
Martin, R. G., Marysville	Yorkshire.
Martin, W. A., Gilead, Ont	Berkshire & Yorkshire.
Mason, H. A., Scarboro, Ont	Berkshire.
Mathiew, Nap., Beauceville, Que	Yorkshire.
Matthewson, John, Virden, Man	Berkshire.
Mayloney, F. A., Chapleau, Que	Yorkshire.
Maynard, J. T., Chilliwack, B.C	Duroc Jersey.
Melborn, Frank, Virden, Man	Berkshire.
Menzies, J. A., Lloydminster, Sask	Yorkshire.
Menzies, W. D., Rising Sun, Alta	Yorkshire.
Mercer, Thos., Markdale, Ont.	Yorkshire.
Messenger, R. J., Bridgetown, N S	———.
Metcalf, H. W., Lacombe, Alta.	———.
Midd, Stephen, Auburn, Ont.	Berkshire.
Miller, Marshall, Brome Centre, Que	Chester White.
Milot, Hercule, Yamachiche, Que.	———.
Miltimore,, E. S., Knowlton, Que	Tamworth.
Mitton, W. J., Thamesville, Ont	Yorkshire.
Molleur, Regis, Pike River, Que	Berkshire.
Mooney, J. A., Valley River, Man	Yorkshire.
Moonie, R. D. Abernethy, Sask	Berkshire.
Moore, H. B., Innisfail, Alta	———.
Moore, W. H., Scotch Lake, N.B	Yorkshire.
Morgan, E. L., Milliken, Ont	Berkshire.
Morkin, J. P., St. Albert, Alta	Berkshire.
Morrison, A. & J., Homewood, Man	Berkshire.
Morrow, R. O., Hilton, Ont	Tamworth.
Motheral, Jas., Drumbo, Ont	Berkshire.
Motson, W. H. & Son, Rapid City, Man	Yorkshire.
Muma, G. B., Ayr, Ont	Yorkshire.
Murdock, Wm., Palmerston, Ont	Yorkshire.
MacLean, W. F., Donlands, Ont	Yorkshire.
MacPhail, John M., Virden, Man	Berkshire.
McBeath, Alex. A., Marshfield, P.E.I	Yorkshire.
McBeath, Geo. Prince Albert, Sask	Berkshire.
McBeth, John, Dromore, Ont	Berkshire.
McClure, Geo. A., Elder's Mills	Berkshire.
McDermit, R., Pierson, Man	Berkshire.
McDiarmid, H. S. Fingal	Yorkshire.
McDonald, A. D., Napinka, Man	Berkshire.
McDonald, Peter, Virden, Man	Berkshire.
McDonald, W. S., Gananoque	———.
McDonnell, D. C., Grenfell, Sask.	Berkshire.
McEwen, P. J., Kertch	Berkshire.
McGhee, Wm., Jr., Beachville	Berkshire.
McGill, J. A., Neepawa, Man	Berkshire.
McGrath, P., Oak Bluff, Man	Poland China.
McIntosh, Mrs. C. W., Lacombe, Alta	Yorkshire.
McKean, Geo., St. John, N.B	Yorkshire.

McLaughlin, O. A., Knowlton, Que.	———.
McLeod, John, Milton West.	Berkshire.
McNish, W. H. & A. H., Lyn.	Tamworth & Yorkshire.
McNally, W. J., Walkerton.	Yorkshire.
McPherson, John, Perth.	Yorkshire.
McPherson, Richard, Brandon, Man.	Berkshire.
McPherson, W. T., Wadena, Sask.	Yorkshire.
Neven, Jos., St. Didace, Que.	Yorkshire.
Nicoll, J. A., Rossendale, Man.	Yorkshire.
Noble, Thos., Daysland, Alta.	Tamworth.
Oak Park Stock Farm Company, Brantford.	Berkshire.
O'Neil, A,, Birr.	———.
Ontario Agricultural College, Guelph.	Yorkshire.
Orchard, Frank, Graysville, Man.	Tamworth.
Oswald, W. A., Petit Brule, Que.	Berkshire.
Ottawa Valley Journal, Ottawa	Berkshire & Yorkshire.
Ouellette, D. & A., Amherstburg.	Berkshire.
Ouimet, Clovis, St. Francis de Salles, Que.	Yorkshire.
Owens, Hon. Wm., Monte Bello, Que.	Yorkshire.
Papin, Phillipe, Vancluse, Que.	———.
Paquin, S., Deschambault, Que.	Yorkshire.
Pare, Joseph, St. Hubert, Que.	Yorkshire.
Parent, J. E., Charlesbourg, Que.	Yorkshire.
Parker, J. H. M., Lennoxville, Que.	Chester White.
Parker & Son, Thos., London.	———.
Patton, David, Paris Station.	Tamworth.
Pearson, S. J. & Son, Meadowvale.	Berkshire.
Pelletier, L. C., La Prairie, Que.	Chester White.
Perreault, Toussanit, St. Esprit, Que.	Chester White.
Perry, P. W., Deloraine, Man.	Yorkshire.
Peterson, August, Weyburn, Sask.	Berkshire.
Phaneuf, Antonie, St. Antoine, (Vercheres) Que.	Chester White.
Phenix, Berthius, Miquelon, Que.	Chester White.
Phillips, Thos., Essex.	Poland China.
Phillips, W. H., Battleford, Sask.	Berkshire.
Pichet, Douat, St. Esprit, Que.	Berkshire.
Pierce, H. C., Wadena, Sask.	Yorkshire.
Pinter, Chas. & Sons, Cowansville, Que.	Tamworth.
Plaunt, H., Northcote.	Berkshire.
Poole, W. R. Freeland	Yorkshire.
Pope, J. C., Regina, Sask.	Yorkshire.
Porter, Alex., Alexander, Man.	Berkshire.
Potter, A. B., Montgomery, Sask.	Yorkshire.
Pritchard, R. J., Roland, Man.	Berkshire.
Prodhomme, R., Osler, Sask.	———.
Provencher, Alfred, Pidgeon, Que.	Yorkshire.
Provencher, E. J., St. Norbert, Que.	Chester White.
Pryor, James A., Leinburg, Sask.	Berkshire.
Purdy, D. A., Lumsden, Sask.	Yorkshire.
Quebec, H. M., Clover Bar, Alta.	Tamworth.
Quintin, Ephrem, Mount Johnston, Que.	Yorkshire.
Redditt, Geo., Richmond Hill	Berkshire.
Reed, Isaac, Ardtrea	Berkshire.
Reid, James, Glen William	Yorkshire.
Reid, R. & Co., Ottawa.	Tamworth & Berkshire.
Rich, W. P., Salmon Arm, B.C.	Berkshire.
Riopel, Aime, St. Esprit, (Montcalm) Que.	Berkshire.
Roberge, J. P., St. Pierre, Que.	———.
Roberts, Wm., Oak Bank, Man.	Berkshire.
Robinson, B. W., Arkola, Sask	Yorkshire.
Rondeau, Norbert, Weedon Centre, Que.	Yorkshire.
Root, Geo. F., Red Deer, Alta.	Berkshire.
Roper Bros., Charlottetown, P.E.I	Tamworth.
Rouleau, A., St. Gregorie, Que.	Yorkshire.
Roulston, W. D., Garnet.	Tamworth.
Rudd, C. C., Guelph	Berkshire.
Rye, Jos., Duagh, Alta.	Tamworth.
Sarvie, Geo., Plessisville, Que.	Yorkshire.
School of Agriculture, La Trappe, Que.	———.
School of Agriculture, St. Anne de la Pocatiere, Que.	Yorkshire.
Scott, John, Atha.	Berkshire.
Scott, Walt. K., Sheho, Sask.	Yorkshire.
Seaman, L. C., Strathcona, Alta.	Tamworth.
Semple, J. R., Brule, N. S.	Berkshire & Yorkshire.
Shannon Bros., Cloverdale, B.C.	Berkshire.
Shea, Thos. M., Fergus, Ont	Berkshire.
Shepard, Frank, Weyburn, Sask.	Berkshire.
Shepherdson, W. J., Walter's Falls.	Berkshire & Tamworth.
Shibley, James B., Harrowsmith	Berkshire.
Shields, W. A., Milton.	Berkshire.
Sinclair, F. G., Grahamsville	Berkshire.
Sinclair, Peter J., Rockston	Yorkshire.
Sisters, St. Joseph, St. Hyacinthe, Que.	Chester Whites.
Smith Bros., South Woodslee.	Berkshire.
Smith, D., Gladstone, Man.	Yorkshire.
Smith. G. M., Hayesville.	Yorkshire.
Smith, John W., Comber.	Berkshire.
Smith, John & Son. Duntroon	Yorkshire.

MEMBERS OF DOMINION SWINE BREEDERS' ASSOCIATION, 1908 AND 1909.—*Continued.*

Name and Address.	Breed.
Smith, W. M., Scotland	Poland China.
Snider, Irwin A., Floradale	———.
Snider, T. & S. E., Dawn Mills	Duroc Jersey.
Snowden, Samuel, Bowmanville	Berkshire.
Spafford, Dufferin, Weyburn, Sask	———.
Sparrow, J. B., St. Agathe, Que	———.
Standish, John E., Rougemont, Que	Chester White.
Standish, Matthew, Rougemont, Que	Chester White.
Steinmann, Jacon, New Hamburg	Duroc Jersey.
Stevens, John M., Bedford, Que	Tamworth & Chester White.
Stevens, W. F., Clover Bar, Alta	Berkshire.
Stewart, David, Carman, Man	Berkshire.
Stewart, J. C., Dalmeny	———.
Stewart, James J., Gladstone, Man	Yorkshire.
Stewart, Robert, Winslow, P.E.I	Yorkshire.
Stewart, Shirley, Uphill	Yorkshire.
Stittson, John, Marshfield, P.E.I	Berkshire.
Stoneycroft Stock Farm, St. Anne de Bellevue, Que	Yorkshire.
Story, F. W., Toronto	———.
Stover, Jacob, Springford	Chester White.
Strachan, John, Crandall, Man	Yorkshire.
Straub, Adam, Elmira	Yorkshire.
Sylvester, Bros., Clairvoux, Que	Chester White.
Sylvester, L. P., St. Theodore d'Acton, Que	Yorkshire.
Taylor, Robert, Goodwood	Yorkshire.
Teasdale, Frank, Concord	Berkshire.
Teasdale, Thos., Concord	Berkshire.
Thompson Bros., Swarthmore, Sask	Yorkshire.
Thompson, Douglas, Woodstock	Berkshire.
Thompson, James, Sardis, B.C	———.
Thomson, Adam, Shakespeare	Berkshire.
Thomson, J. C., Mildmay	Yorkshire.
Thouin, Louis, Repentigny, Que	Yorkshire.
Thuell, Wm. C., Brussels	Berkshire.
Thourston, R. E., Bobcaygeon	Yorkshire.
Tibbets, John W., Knowlton, Que	Yorkshire.
Todd, J. W., Corinth	Berkshire & Tamworth.
Tourigmy, Paul, Victoriaville, Que	Berkshire.
Tran, W. H., Cedar Grove	Yorkshire.
Trann, W. L., Crystal City, Man	Tamworth & Poland China.
Trappistes, Les Reverend Peres, Mistassini, Que	Yorkshire.
Trappistes, R. R. P. P., St. Norbert, Man	———.
Tregillus, W. J., Calgary, Alta	Yorkshire.
Trudel, Theophile, St. Prosper, Que	Yorkshire.
Turnbull, T., Manitou, Man	Yorkshire.
Tyles, Herbert, Rosser, Man	Yorkshire.
Vance, A. D., Prescott	Yorkshire.
Vance, Robert, Ida	Berkshire.
Vanderlip, H. M., Cainsville	Berkshire.
Van Horn. Sir Wm., Montreal, Que	Yorkshire.
Vokes, Chas., Quill Lake, Sask	Yorkshire.
Vollbrecht, Wm., Creelman, Sask	Yorkshire.
Walker, M. E., Glencoe	Chester White.
Walker, James W., Nutana, Sask	Poland China.
Wallace, John H., Renfrew	Berkshire.
Wallace, R. M. Kars	Berkshire.
Wallace, Wm. A., Kars	Berkshire.
Warner, D. W., Edmonton, Alta	Berkshire.
Washington, F. J., Weyburn, Sask	Yorkshires.
Watson, A. R. M., Weyburn, Sask	Berkshire.
Watson, Chris., Prosperity, Sask	Yorkshire.
Webb, Horatio, Sardis, B.C	Yorkshire.
Weightman, M. C., Monteith, Man	Yorkshire.
Weiler, A. M., Wetaskiwin, Alta	Yorkshire.
Westney Bros., Audley	Yorkshire.
White, Ed. H., Battleford, Sask	Yorkshire.
White, O. J., Hamiota, Man	Yorkshire.
White, S. H. Company, Limited, Forest Glen, N.B	———.
Wigg, Wm., Lewisville, Alta	Berkshire.
Williams, M. P., Vernon, B.C	———.
Wilson, Arthur S., Hornby	Berkshire.
Wilson, J. C., Sine	Berkshire & Tamworth.
Wilson, J. J., Milton	Berkshire.
Wilson, J & Son, Fergus	Yorkshire.
Wilson, Wm. C. & Son, East Oro	Yorkshire.
Winters, D. B., Vermillion, Alta	Berkshire.
Wintle, Gilbert S., Richmond, Que	Chester White.
Wright, W. E., Glanworth	Chester White.
Wood, G. J. T., Islington	Berkshire.
Woodburn, Mrs. R. T., Lisgar Station, Que	Yorkshire.
Woodnoiss, E. Sidney, Binscarth, Man	Berkshire.
Young, Cyrus, Bathgate, Alta	Berkshire.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.

Name and Address.	*Variety.*
Abbott, C. C., Stratford	Buff Orpingtons.
Adams, F. T., 127 Hamilton Rd., London	Partridge Wyandottes.
Agnew, G. F., 15 Lane St., Guelph	Buff Orpingtons.
Aird, P. E., Box 949, Montreal, Que	Buff Orpingtons, Game Bantams, A.O.V.
Allen, Gerald, Norway	Buff Wyandottes, Buff Orpingtons.
Allen, Gilbert, Bracondale	White Plymouth Rocks.
Alexander, W. J., Ashgrove	Turkeys.
Andrewes, Fred A., London	White Plymouth Rocks.
Archer, Wm., Paisley	White Wyandottes.
Armstrong, Geo. F., Bracebridge	White Wyandottes, Black and White Orpingtons.
Arthur, Jas., 731 Lorne Ave., London	Silver Laced Wyandottes.
Ashby, Alf. T., 198 Riverdale Ave., Toronto	Pigeons.
Baker, Geo., Simcoe	White Turkeys.
Barber, W., 118 Roncesvalles Av., Toronto	Games, Game Bantoms.
Barr, John A., Ingersoll	Buff Orpingtons, Dressed Poultry.
Baldwin, L. H., Forest Hill Rd., Toronto	White Wyandottes.
Barnes, Robert, 41 Colborne St, Toronto	Buff Orpingtons, Buff Cochin Bantams.
Bailey, J. E., St. Thomas	Birchen Game Bantams, Buff Cochin Bantams.
Baptie, Jas., Springville	Silver Laced Wyandottes, Hamburgs.
Bawden, John, Ridgetown	Buff Plymouth Rocks, Buff Orpingtons.
Baker, G. L., Hespeler	R.C. Rhode Island Reds.
Ballantyne, J. M., Bracebridge	S.C. Rhode Island Reds, G.P. Hamburgs, Silkies, Buff Cochin Bantams, Black Cochin Bantams, Japanese Black Tailed Bantams, Buff Leghorns, Rabbits, Hares.
Barber, Miss Z., Erin	Barred Plymouth Rocks, Dressed Poultry.
Baker Bros., Guelph	Turkeys, White ; Embden Geese, African Geese, Aylesbury Ducks, Rouen Ducks.
Bell, Guy, Brampton	White Plymouth Rocks.
Bell, W. J., Angus	R.C. White Leghorns, Turkey.
Bell, Fred., 400 Crawford St., Toronto	Pigeons.
Benson & Tregwin, Midland	Pigeons.
Becker, Peter P., Waterloo	Partridge Wyandottes, A.O.V. Fowls.
Becker, H. F., Waterloo	S. C. Brown Leghorns.
Beattie, W. H., Wilton Grove	Turkeys.
Bedford, John, 25 Hunter St., Toronto	Barred Plymouth Rocks.
Bibby, W. H., 114 Northumberl'd St., Guelph	White Plymouth Rocks, S.C. Rhode Island Reds, Buff Leghorns.
Blain, Jas. W., Milton	White Wyandottes.
Bogart, Frank C., Napanee	White Orpingtons.
Bower, Thos., Wingham	Buff Orpingtons, Pyle Game Bantams.
Bogue, G. & J., Strathroy	Black Wyandottes, Javas, Spanish, Dorkings, Houdans, Creve-Coeurs, LeFleche, Polands, G.S. Hamburgs, Sultans, Ducks.
Brill, L. Austin, 737 Princess Ave., London	Bantams.
Brock, C. W. P., Waterford	Buff Plymouth Rocks, Minorcas, Ducks.
Brown & Reid, 413 York Rd., Guelph	S.C. Rhode Island Reds.
Brown, John L., Seaforth	White Plymouth Rocks.
Bradley, John, Milton	S.C. Brown Leghorns.
Braun, E., Preston	S.C. Black Minorcas.
Burns, Gordon A., Paris	Silver Grey Dorkings, Dressed Poultry.
Bunt, Fred, Vallentyne	Dark Brahmas, Wyandottes, R.C. Rhode Island Reds, Games, Leghorns, Andalusians, Dorkings, Buff Orpingtons, S.S. Hamburgs.
Burn, Geo., Tillsonburg	Dominiques, Games, White Dorkings, Silver Polands, A. O. V. Fowls, Game Bantams, Japanese Bantams, Geese, Ducks, Pigeons, Black Leghorns.
Bullock, W. J., Gananoque	White Wyandottes.
Carter, Wm., Constance	R.C. White Leghorns, Hamburgs.
Carroll, J. A., St. James Park, London	White Plymouth Rocks, White Wyandottes.
Cadman, Wm., 679 Talbot St., St. Thomas	R.C. Brown Leghorns, S.S. Hamburgs, Black Rose Comb Bantams, Partridge Cochin Bantams.
Casey, Will, Mitchell	Indian Games, any variety, Rouen Ducks.
Campbell, J. M., Crosshill	Buff Plymouth Rocks.
Carbert, G. B., Campbellville	Dominiques, Geese.
Chant, Rev. J. H., Newburgh	R.C. Black Minorcas.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.

Name and Address.	*Variety.*
Clarke, J. W., Cainsville	Buff Orpingtons.
Cosh, H. V., Bobcaygeon	Andalusians.
Coote, W. F., Hamilton	Black Hamburgs.
Cornwall, Nate K., Thamesville	Buff Leghorns.
Collins, Wm., Union	Pyle Games, Black Orpingtons, Black Hamburgs, Pekin Ducks.
Cole, T. J., Bowmanville	Black Red Games.
Cook, G. C., Midland	Buff Wyandottes, S.C. Black Minorcas.
Cook, Frank & Son, Midland	Games, Pigeons.
Cooper, John H , Seaforth	White Wyandottes.
Crowe, John, 275 Woolwich St., Guelph	Pyle Game Bantams.
Crowe, Chas. R., 284 Woolwich St., Guelph.	Game Bantams.
Crane, Alfred C., Eden Mills	Turkeys, Ducks.
Currier, Chas. H., 196 Shaw St., Toronto	Pigeons.
Cullis & Lean, Powles Corners	Bronze Turkeys.
Daniel, C. J., 196 River St., Toronto	Silver Laced Wyandottes, S. C. Rhode Island Reds, Black Sumatra Games, Black Orpingtons.
Daniel, Wm., Plattsville	Wyandottes.
Day, John, 17 Menitt St., St. Catharines	S. C. Rhode Island Reds.
Daley, J. F., Seaforth	White Wyandottes.
Dawson, W., Niagara-on-the-Lake	Wyandottes, Orpingtons, Bantams.
Deverell, E. M., Whitby	Buff Cochins.
Devitt, A., Berlin	White Wyandottes.
Dickie, R. T., 395 Oxford St., London	Brahma Bantams.
Dinner, R., St. Thomas	Black Wyandottes.
Douglas, D. & Sons, Mitchell	S.C. White Leghorns, Bronze Turkeys, Toulouse Geese, Pekin Ducks.
Doidge & McNeil, 30 Cartwright St., London.	Indian Game Bantams, Bantams.
Doan, A. E., Box 61, Watford	Black Leghorns.
Donovan, H. B., 14 Bank St., Toronto	Silkies, Game Bantams, Bantams, Ducks.
Dunne, H., 1492 Queen St. West, Toronto	S. C. Black Minorcas.
Dundas, James, Deer Park	Buff Leghorns, Buff Wyandottes.
Durst Bros., Benmiller	S. C. White Leghorns.
Edsall, J. H., Bowmanville	Black Leghorns.
Elwood, Jack, 197 Victor Ave., Toronto	Pigeons.
Elliott, Geo. & Co., Stevenson Ave., East Toronto	White Plymouth Rocks, Houdans, Buff Wyandottes.
Elliott, W.J., 96 Queenston St ,St. Catharines.	S.C. Black Minorcas, Black Red Games.
Emrick, Henry, Bridgeburg	Cochins.
Engel, A. J., Waterloo	S.C. Brown Leghorns, White Minorcas.
Evans, C. M., 31 Euclid Ave., London	Silver Pencilled Wyandottes.
Eyer, John H., 580 Avenue Rd., Toronto	Barred Plymouth Rocks, S.C. White Leghorns.
Faulds, T. A., 11 Victor St., London	Minorcas.
Ferguson, Wm., 249 West St., Brantford	S.C. White Leghorns.
Finchamp & Topping, 462 Simcoe St., London.	Games.
Fidler, J. E., Brockville	Partridge Wyandottes.
Flawn, Alfred, 130 Horton St., London	Silver Laced Wyandottes, Indian Game Bantams.
Ford, Jas. & Son, Drumquin	Golden Laced Wyandottes, Turkeys.
Foster, Jos., Brampton	Plymouth Rocks, Dorkings, Orpingtons, A.O.V. Fowls.
Fox, Wm., 597 King St. West, Toronto	Cavies, Belgian Hares.
Fraleigh, E., St. Marys	Black Orpingtons.
Fraleigh, H., Forest	Black Cochin Bantams.
Furminger, S. D., St. Catharines	Ducks.
Gallinger, F. H., South End	Black Leghorns.
Gendron, A. R., Penetanguishene	S.C. Rhode Island Reds.
Glass, S. F., London	Partridge Wyandottes.
Gorvett, Chas., Sparta	S.C. Black Minorcas, Andalusians.
Goldie, Roswell, Perth St., Guelph	Silver Grey Dorkings.
Goebel, A., Mitchell	Wyandottes, Indian Games, S.C. Black Minorcas.
Gormley, John, Pickering	Barred Plymouth Rocks.
Greenshields, J. S., Danville	Pigeons.
Graham, A.W., 16 Margaret St., St. Thomas.	Wyandottes, R.C. Rhode Island Reds.
Grant, R. B., Paisley	S.C. Black Minorcas.
Grier, F.H. & P.L., Cavers St., Owen Sound.	Rhode Island Reds, Leghorns, S. C. White Andalusians, Buff Orpingtons, A.O.V. Fowls, A.O.V. Ducks.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.—*Continued.*

Name and Address.	*Variety.*
Grigg, A. J., Clinton, Ont.	Games, Black Reds, Game Bantams.
Graham, R. B., Galt, Ont.	Leghorns, S.C. Buff.
Grieve, G. Wilson, Hastings St., Parkhill	Wyandottes.
Graham Bros., Parkhill	Leghorns, S. C. White.
Gurney, W. A., 908 Princess Ave., London.	Leghorns, S.C. Brown.
Harper, J. A , Waterloo, Ont.	Game Bantams, Brown Reds.
Hamm, Perry, 796 Gerrard St., East, Toronto.	Pigeons.
Hall, Chas. & Son, Trafalgar, Ont.	Plymouth Rocks, Barred; White Wyandottes, Pyle Game Bantams.
Hart & Grimoldby, Box 21, Owen Sound	Game Bantams
Hatton, J. & T., 780 Dundas St., London, Ont.	Pigeons, Game Bantams, Pyle.
Harrison, Jos., Oak St., Collingwood, Ont.	Leghorns, S C. White.
Handley, Jno., 20 Lowell St., Galt	Cochins, Partridge; Games, Indian; Leghorns, S.C. Brown.
Henry, Jas., 62 Bellevue St., Guelph, Ont.	Plymouth Rocks, Barred.
Hellyer. A. W. E., 69 Belmont Ave., Ottawa.	Orpingtons, Buff.
Henderson, G. G., Hamilton	Leghorns, S.C. Brown.
Henderson & Billings, St. Marys	Wyandottes, Silver Laced; Leghorns, R.C. Brown.
Hewitt, Jack, St. Marie St., Collingwood	Bantams.
Hintonburg Poultry Yards, 981 Wellington St., Ottawa, Ont.	Wyandottes; Orpingtons, Black.
Hill, Lyman H., Jackson, Michigan	Plymouth Rocks, White.
Hoffman, H. A., Ridgetown, Ont.	Orpingtons.
Hogarth, Wm. E., Hensall, Ont.	Plymouth Rocks, White; Leghorns, S.C. White.
Hoover, M. R., Locust Hill	Leghorns, R.C. White.
Hood, W. J., 17 McTague St., Guelph, Ont.	Orpingtons, Buff; Bantam Cochin, Buff.
Hodge, Jas., East Toronto	Plymouth Rocks, Barred; Orpingtons, Black.
Howard, W., Box 372, Guelph	Wyandottes, Black; Bantams, G. Seabright; Bantams, Cochin Buff.
Howard, G. T., Box 372, Guelph, Ont.	Andalusians; Game Bantams, Any Other Variety; Bantams, A.O.V.
Hockin, Chas., London	Plymouth Rocks, Barred.
Hodgkin, F. W., 29 Edwin St., Guelph	Leghorns, Black; Canaries.
Holden, Geo. F., Port Dover, Ont.	Plymouth Rocks, Barred.
Holmhurst Poultry Yards, Whitby, Ont.	Cochin, Buff.
Hughes & Taylor, Court House, London.	Rhode Island Reds.
Innes, Jno., Rockwood, Ont.	Silkies
Jarvis, Jno. W., 153 Wreay St., London	Light Brahmas.
Jefferies, E., 244 Bain Ave., Toronto	Leghorns, Buff.
Karn, H., 174 Water St., Guelph, Ont.	Ducks, A.O.V.
Kerns, Leslie, Freeman, Ont.	Plymouth Rocks, Barred.
Kemp & Waterman, 39 Elmwood Ave., London	Orpingtons, Black.
Kellium, H. & J.	———
Kiley, T. J., 855 Maitland St., London	Game Bantams, Bantams.
Kinder, Geo. W , Box 99, Strathroy	Red Cap.
Klager, Jno. E., Hespeler	Rhode Island Red.
Knight, Isaac T. & Co., Arkell	Geese, A.O.V. Ducks.
Knight, Alfred, Box 103, Davisville	Pigeons.
Krouse, F. W., Box 587, Guelph, Ont.	Javas, Black; Rhode Island Reds; Game, A.O.V.; Dorkings, Silver Grey; Turkeys, Bronze.
Lawson, J., Almonte	Games.
Lemon, Wilbur, Lynden	Wyandottes.
Levan, Wilbert, 40 Inkerman St., Guelph, Ont.	Wyandottes, Black.
Limon, H. E., 10 St. Alban's St., Toronto	Pigeons.
Loehr, Erhard, New Hamburg	Wyandottes, Silver Pencilled.
Luxton, A. G. H., Milton West	Dominiques; Geese, Brown Chinese; Turkeys, A.O.V.; Geese, A.O.V.
Lundy, John H., 70 Simcoe St., Niagara Falls.	Rhode Island Reds, R. C.
Lush, Harry T., 182 Dublin St., Peterboro.	Cochin, White; Orpingtons; Hamburgs.
Massie, Chas., Port Hope	Wyandottes, White.
Maple Leaf Poultry Yards, 30 Garth St., Guelph	Wyandottes.
Martin, Irwin K., Galt, Ont.	Leghorns, R.C. White.
Mack, G. & H., 39 Central St., Guelph	Wyandottes, White.
Magill, J. H., Sullivan St., Port Hope	Wyandottes, Golden Laced; Pigeons.
Martin, Jno. S., Port Dover	Wyandottes, White.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.—*Continued.*

Name and Address.	*Variety.*
Meldrim, Wm. Jas., 161 East Avenue, N. Hamilton	Wyandottes.
Meyer, J. E., Hespeler, Ont.	Wyandottes.
Middlemiss, R. C., 120 William St., Brantford	Wyandottes, Columbian.
Millard, I. K., Box 173, Dundas	Plymouth Rocks, Barred.
Milne & Cavanagh, 70 Mill St., South Oshawa	Orpingtons, Buff.
Mihm, Wm. J., 1 Richardson St., Guelph	Rhode Island Reds, S.C.
Mitchell, Douglas, 42 Edenbourgh Rd, Guelph	Pigeons.
Montgomery, E. F., 27 E. Tiffany St., Guelph	S.C. Brown Leghorns.
Moore Bros., 199 Cannon St. East, Hamilton.	White Orpingtons.
Monroe, Geo. E., Forest	White Plymouth Rocks.
Montgomery, Jas. E., Brantford	Columbian Wyandottes.
Moyer, A. C., Waterloo	White Minorcas.
Mounce, J. E., Armstrong Mills	Utility Fowl.
Mountjoy, B. J., 132 Mount Pleasant Ave., London	R. C. Black Minorca.
Murray, W. G., Strathroy	Black Hamburgs, Indian Game Bantams, Bantams.
MacRae, J. N., 16 Spruce St., Galt	Bantams and R.C. Black Minorcas.
McAree, J.V., Mimico	A.O.V. Game, Bantams, Pigeons.
McCurdy, R., 176 Oxford St., London	Black Langshans.
McCormack, Jas. M., Rockton	Dorkings, Toulouse Geese, Rouen Ducks.
McDougall, A. & Son, Milton	Turkeys, Geese.
McDiarmid, Jas. S., Ingersoll	S.C. Brown Leghorns.
McEwen, P. J., Kertch	Buff Orpingtons.
McGlennon, Wallace, Colborne	Silver Grey Dorkings.
McIntosh & Halliday, Spencerville	Light Brahmas, Wyandottes, Leghorns, Houdans, Red Caps, A.O.V. Fowls.
McIntosh, G. E., Forest	Light Brahmas.
McKenzie, D., 150 Darling St., Brantford	Andalusian.
McKee, Harry, Norwich	Silver Grey Dorkings.
McLeod, Norman, 129 John St., London	White Wyandottes.
McLeod, Kenneth A., 17 Winnet St., Brantford	Leghorns.
McLeod, W. J., 26 Evergreen Ave., London	Black Leghorns.
McMaster, W. A., Guelph	R.C. Rhode Island Reds.
McNeil, Wm., 778 Waterloo St., London	Polands, A.O.V. Fowls.
McPherson, John, 57 Dundas St., London	Golden-Laced Wyandottes.
Northey. J. A., 42 Forest Hill Rd., Toronto	Buff Cochin Bantams.
Oke, Richard, Box 361, London	Partridge Cochins, Javas, Black Orpingtons, Creve-Coeurs, LaFleche, Hamburgs, Sultans, Bantams.
Orr & Creeden, 54 Albion St., Brantford	S.C. Brown Leghorns.
Osgoode, Roy, Preston	Pigeons.
Partlo, H. W., Ingersoll	Light Brahmas, Brahma Bantams.
Parrott, Thos, Collingwood	Games.
Patterson, Robt., Wellington St., Guelph	Silver Pencilled Wyandottes, Black Orpingtons.
Parkinson, J. W., Crumlin	Pyle Games.
Parkinson, B. L., 151 Horton St., London	Columbian Wyandottes.
Peter Pan Poultry Farm, 92 Bellevue St., Guelph	Barred Plymouth Rocks.
Pearson, W., 249 Suffolk St., Guelph	Game Bantams, Bantams, S.C. Rhode Island Reds.
Peep O'Day Poultry Farm, 92 Carling St., London	Wyandottes.
Penwarden, E. O., 20 Jackson St., St. Thomas	Houdans.
Peer, Gideon, 435 Metcalfe St., Guelph	Barred Plymouth Rocks, White Wyandottes, White Orpingtons.
Philpot, Jack, 12 Wellington St., Guelph	Barred Plymouth Rocks, Black Wyandottes, S.C. Rhode Island Reds, A.O.V. Fowls, White Cochin Bantams, Black Cochin Bantams.
Poole, G. & H., 124 Northumberland St., Guelph	Bantams, Pigeons.
Pranschke, W. C., 86 Concord St., Ottawa.	Columbian Wyandottes.
Pringle, John, 187 Wortley Rd., London	Barred Plymouth Rocks.
Ramsden, Horace, 73 Ashdale Ave., Toronto	Buff Wyandottes.
Read, J. C., Owen Sound	White Minorcas.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.—*Continued.*

Name and Address.	*Variety.*
Reid, W. H., 35 Union St., Kingston	Pigeons.
Readwin, A. & T., Guelph	Wyandottes, Black Javas, Leghorns, S. S. Hamburgs, Silkies, A.O.V. Fowls, White Japanese Bantams, Pigeons.
Rice, Thos., Box 376, Whitby	White Plymouth Rocks, S. C. White Leghorns.
Ridler, L., Guelph	Langshans, White Orpingtons, A.O.V. Games, Pigeons, A.O.V. Rabbits.
Rook Bros., Prescott	Game Bantams.
Rosser Bros., 60 Close Ave., Toronto	Bantams.
Roy, J. B. A., St. Pie, Qae	Buff Orpingtons.
Routledge, C. G., Davisville	S.C. Rhode Island Reds.
Roberts, J. W., 34 West Ave., St. Thomas.	Black Red Games.
Robertson, Geo., Box 242, Ottawa	Plymouth Rocks, Indian Games, any variety, Andalusians, Dorkings, R.C. White Leghorns, Black Leghorns, Spanish.
Robertson, Geo. A., St. Catharines	White Plymouth Rocks.
Ross, Harry A., 91 Waterloo Ave., Guelph.	White Wyandottes.
Rundle, S., Guelph	Partridge Wyandottes.
Russell, Jos., 437 Jarvis St., Toronto	White Wyandottes, S.C. Rhode Island Reds.
Rymer, Chas. H., 9 Nelson St., St. Catharines	Wyandottes, Buff Orpingtons.
Samuel, J. Hughes, 22 Berkeley Ave., Norway	Buff Wyandottes.
Sanderson, J. C., Gravel Road, St. Thomas.	Buff Wyandottes.
Sage, L. C., Wellington Rd., London	Dark Brahmas, Partridge Wyandottes.
Saunders, E., 592 Maitland St., London	Black Sumatra Games, R.C. Brown Leghorns, Silkies.
Scanlon Bros., Ennotville	Geese, Pekin Ducks.
Schierholtz, Otto, Elmira	White Plymouth Rocks, A.O.V. Fowls.
Scott, Rev. W. N, Athens	Silver Pencilled Wyandottes, A.O.V. Fowls.
Schelly Bros., Brantford	Columbian Wyandottes.
Scoyne, Chester, 80 Pipe Line Rd., London.	Black Orpingtons.
Scott, Peter, Box 227, Guelph	S.C. Brown Leghorns.
Scott, T. H., 39 Elgin St., St. Thomas	Columbian Wyandottes, R.C. Black Minorcas.
Sellers, Stephen, Zephyr	Plymouth Bocks, Indian Games, any variety, S.C. White Leghorns, Buff Leghorns, Spanish, A.O.V. Geese, Ducks.
Shephardson, Geo. M., Sombra	White Plymouth Rocks.
Shaw, Frank, 75 Hughes St., St. Thomas	Black Sumatra Games.
Shaw, John McE., Forest	Bantams.
Sherlock, Thos., 915 Lorne Ave., London	Game Bantams.
Shea, Thos. M., Fergus	Geese, Ducks.
Sherrick, Caleb, 199 Park St., Detroit, Mich.	Columbian Wyandottes.
Slessor, W. J., 520 Adelaide St., London	Bantams.
Smith, Joe. R., Strathroy	Black Wyandottes, Bantams.
Smith, Adolph, 151 Elizabeth St., Guelph	Andalusians, A.O.V. Fowls.
Smith, Wm., 14 Elmer Ave., Kew Beach, Toronto	A.O.V. Games, S.C. Black Minorcas.
Small, J. A., 502 St. Clarens Ave., Toronto.	Buff Cochins, Polands.
Snyder, Elias, Burgessville	Barred Plymouth Rocks.
Snetsinger, James, Eamers' Corners	Dark Brahmas, White Plymouth Rocks, Leghorns, White Orpingtons, Pekin Ducks.
Spry & Mick, 144 Dundas St., Toronto	Buff Wyandottes.
Spiars Bros., Guelph	Game Bantams, Belgian Hares.
Steer, W., 170 Hamilton Rd., London	Pigeons.
Stapleford, S., Watford	White Plymouth Rocks, Black Red Games.
Streib, Jacob, West Lorne	S.C. Brown Leghorns.
Sheward, Bert, 133 Neeve St., Guelph	S.C. Rhode Island Reds, Pigeons.
Stewart, Howard, 85 Broadview Ave, Toronto	Pigeons.
Syer, E., Milton	Dominiques, Indian Games, any variety, S.C. White Leghorns.
Taylor, C. M., Lyu	Buff Wyandottes.
Telfer, Wm., Brantford	Leghorns.
Teale, W. J., 21 McTague St., Guelph	Black Sumatra Games, Bantams.
Tew, Richard, 9 Berkley Ave., Norway	R.C. Rhode Island Reds.

MEMBERS OF THE WESTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED, WINTER FAIR, 1908.—*Concluded*.

Name and Address.	*Variety.*
Tilt, C. A. R., Doon	Dark Brahmas, Black Cochins. Black Langshans, Bantams, Geese, Ducks.
Tottle, Chas. V., Church St., Weston	Silver Grey Dorkings.
Tovell, C. H., Galt	S.C. Buff Leghorns.
Trimble, Geo. D., 68 Willoughby Ave., W. Toronto	White Fantails.
Traplin, T. H., Hespeler	White Wyandottes, Orpingtons.
Tyson & McMaster, Melleville St., Guelph	Game Bantams.
Vickers, Thos., Owen Sound	White Minorcas, Buff Orpingtons.
Walker, W. R., 43 Surrey St., Guelph	Game Bantams.
Watson, Edwin D., 30 Charles St., Guelph	Black Cochin Bantams.
Wait, J. G., Wicklow	S. C. White Leghorns, Buff Orpingtons.
Warrington, J. H., Cornwall	Black Wyandottes, Black Javas, Spanish, Dorkings, Creve Coeurs, Lafleche.
Warder, A. B., Spry	Pigeons.
Wankel, Emil & Son, Waterloo	Rhode Island Reds.
Wales, F., Milton	Partridge Cochins, Black Langshans, S.C. White Leghorns, Silver Grey Dorkings.
Waters, Mrs. Chas., 13 McIntyre St., St. Thomas	Light Brahmas.
Westbrook, Jas. H., 553 Dundas St., London	Black Rose Comb Bantams.
Wells, Bros., 898 Dundas St., London	Red Caps.
Wheadon, R. L., 146 London Rd., Guelph	Houdans, Black Hamburgs, Bantams.
Whitney, C. J., Galt	White Plymouth Rocks.
Wilson, C. H., Hawkestone	Dark Brahmas, Partridge Cochins, R.C. Brown Leghorns.
Wilson, Wm., 219 Grange St., Guelph	White Wyandottes.
Wismer, H. F,, St. Thomas	Indian Runner Ducks.
Witler, Clayton, 200 Glasgow St., Berlin	Black Javas.
Worrod, T., Angus	Turkeys.
Worthington, C. D., 43 Ontario St., Guelph	Andalusians, Rhode Island Reds.
Wright, W. E., Glanworth	Red Caps, Turkeys.
Wyatt, Hugh, London	Buff Cochins, White Wyandottes, Partridge Cochin Bantams.
Yakes, Harvey B., 220 West St., Brantford	S.C. Brown Leghorns.

MEMBERS OF THE EASTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED AT THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.

Aird, P. E., Montreal Annex, Que	Buff Orpingtons.
Allan, John O., Scotch Line	S. C. White Leghorns.
Alexander, Dr. D. B., Shawville, Que	Buff Orpingtons.
Alexander, G. W., Beachburg	Barred Plymouth Rocks.
Armstrong, Adam A., Fergus	Brahmas, Cochins, Plymouth Rocks, Wyandottes, Minorcas, Orpingtons.
Baker Bros., Guelph	Andalusians, Water Fowls.
Baker, Geo., Simcoe	Turkeys.
Baptie, H., Springville	Silver Wyandottes, Hamburgs.
Barber, W., 118 Roncesvalles Ave., Toronto	Games, Game Bantams.
Barrett, J. A., Catharine St., Ottawa	W. C. B. Polands.
Beaton & Stoate, Thornton St., Ottawa	White Wyandottes, Buff Cochin Bantams.
Becker, H. F., Waterloo	S. C. Brown Leghorns.
Belford, J. A., 22 Creighton St., Ottawa	White Orpingtons, Pigeons.
Benjamin, E. H., 125 Arthur St., Ottawa	Old English or Pit Games.
Benson, J. A., Billings Bridge	White Minorcas.
Blakely, R. E., 68 John St., Ottawa	Buff Wyandottes, Pigeons.
Bogue, G. & J., Strathroy	Cochins, Wyandottes, Javas, Spanish, Dorkings, Houdans, Creve-Coeurs, LaFleche, Hamburgs, Polands, Bantams, Ducks.
Bradley, Geo. R., Carsonby	Turkeys.
Bradley, T., 117 McDonald St., Ottawa	S. C. Brown Leghorns, Buff Cochin Bantams.
Brown, Galt E., Point Fortune, Que	Light Brahmas, White Wyandottes, Games, Black Minorcas, Buff Orpingtons, Hamburgs, Polands, Bantams.

MEMBERS OF THE EASTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED AT THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.—*Continued.*

Name and Address.	*Variety.*
Bulloch, W. J., Gananoque	White Wyandottes.
Carleton, W. H., 110 Stanley Ave., Ottawa.	S. C. White Leghorns.
Clark, H., 267 East Ave., Ottawa East	Silver Wyandottes.
Code, R. N., Perth	White Wyandottes.
Collins, G. H. A., Cumming's Bridge	S. C. Brown Leghorns.
Cornish, C. C., 359 Somerset St., Ottawa	Light Brahmas, Black Red Game Bantams, Buff Cochin Bantams, Pigeons.
Craig, Wm., 254 Flora St., Ottawa	Plymouth Rocks.
Crouch, Miss Sarah, Billings Bridge	White Leghorns.
Currier, C. H., 196 Shaw St., Toronto	Silver Wyandottes.
Dalglish, Jas. A., c/o John M. Garland, Son & Co., Ottawa	Rhode Island Reds.
Dallimore, Edward K., 18 Spruce St., Toronto.	Pigeons.
Devitt, A., 10 Homewood Ave., Berlin	White Wyandottes.
Doidge & McNeil, 30 Cartwright St., London.	Game Bantams, Bantams.
Dowler, Willie, Billings Bridge	Pigeons.
Dunlop, T. G., Spencerville	Brahmas, White Wyandotte, Andalusians.
Dynes, Alex., Hintonburg	Barred Plymouth Rocks, Pekin Ducks.
Ellis, Sydney E., Renfrew	S. C. Buff Leghorns.
Ellis, Wm., Prescott	Black Minorcas, Buff Orpingtons.
Engel, A. J., Waterloo	S. C. Brown Leghorns.
Evans, E. M., 31 Euclid Ave., London	Wyandottes.
Fallis, R., Box 7, Ottawa South	White Wyandottes.
Fennell, W. H., Brockville	S. S. Hamburgs.
Fidler, J. E., Brockville	Barred Plymouth Rocks, Partridge Wyandottes.
Fortier, Jos., St. Scholastique, Que	Plymouth Rocks.
Foster, A. H., Twin Elm	Turkeys.
Fraleigh, Howard, Forest	Bantams.
Fraser, J. W., Renfrew	Black Minorcas.
Frith, E. R., Maxville	Wyandottes, Old English or Pit Games, Black Minorcas, Pigeons.
Gill, John I., Ottawa	Rhode Island Reds, Leghorns.
Goodall, E. L., 305 Wellington St., Ottawa	Barred Plymouth Rocks.
Grimes, J. Allan, 97 McLaren St., Ottawa	Rhode Island Reds.
Gurney, W. A., 908 Princess Ave., London.	Barred Plymouth Rocks, S.C. Brown Leghorns.
Hamilton & Scoyne, 29 Orchard St., London,	Orpingtons, A.O.V.
Harkness, Miss C. M., Arnprior	Game Bantams, A.O.V.
Hellyer, A. W. E., Belmont Ave., Ottawa	Buff Orpingtons.
Henderson, G. G., Hamilton	S.C. Brown Leghorns.
Hiawatha Pigeon Lofts, 635 St. Patrick St., Ottawa	Pigeons.
Hicks & Lapointe, Perth	White Wyandottes, S.C. Black Minorcas.
Highland Park Poultry Yards, Westboro'	White Wyandottes.
Higman, Geo., Sr., 61 Sussex St., Ottawa	Wyandottes, Faverolles.
Higman, Geo., Jr., 97 College Ave., Ottawa.	Partridge Wyandottes.
Hillhouse, A. P., Bondville, Que	Plymouth Rocks, Wyandottes, Rhode Island Reds.
Hintonburg Poultry Yards, Ottawa	Plymouth Rocks, Wyandottes, Rhode Island Reds.
Hoffman, H. A., Ridgetown	Buff Orpingtons.
Hoover, M. R., Locust Hill	Barred Plymouth Rocks, Leghorns.
Hunt, B. J., Park Ave., Ottawa South	White Wyandottes.
James, F. A., 153 Centre St., Ottawa	Barred Plymouth Rocks.
Knight, Alfred, Davisville Ave., Davisville,	Pigeons.
Lake, G., 155 Russell Ave., Ottawa	White Wyandottes.
Lambertus, John A., Eganville	Barred Plymouth Rocks.
LaRose, Chas., Cornwall	Cochins, Barred Plymouth Rocks, Games, Leghorns, Andalusians,
Lawson, J., Almonte	Games.
Limon, E., 10 St. Alban's St., Toronto	Pigeons.
McGill, J. H., Port Hope	Golden Wyandottes, Pigeons.
Mason, John & Son, 188 Turner St., Ottawa,	Buff Plymouth Rocks, Buff Wyandottes, Buff Orpingtons.
Matheson, G. M., 69 Russell Ave., Ottawa	Partridge Wyandottes.
Moyer, A. C., Waterloo	White Minorcas.
Mulligan, Lawrence, Harbord	Pigeons.
Mulville, James, V., Westport	Buff Orpingtons.
Murphy, Joshua, Renfrew	Golden Wyandottes, R.C. Rhode Island Reds, S.C. White Leghorns.
Mutchmor & Co., 68 First Ave., Ottawa	Pigeons, Game Bantams.
McAree, J. V., Mimico	Games, Game Bantams, Pigeons.

MEMBERS OF THE EASTERN ONTARIO POULTRY ASSOCIATION AND VARIETIES ENTERED AT THE EASTERN ONTARIO LIVE STOCK AND POULTRY SHOW, 1909.—*Concluded.*

Name and Address.	*Varieey.*
McCormack, Jas. L., 33 Murray St., Brantford	S.C. White Leghorns.
McDougal & Bedlow, Fairfield East	White Wyandottes, Buff Orpingtons, Houdans, Games, Spanish, Dorkings, Ducks.
McIntosh & Halliday, Spencerville	Dark Brahmas, Langshans, Plymouth Rocks, White Wyandottes, Rhode Island Reds, Pyle Games, S.C. Buff Leghorns, White Minorcas, Orpingtons, Houdans, Faverolles.
McKellar, Donald, Hawkesbury	S.C. White Leghorns.
McNeil, Wm., 778 Waterloo St., London	Polands.
Neate, M. C., 33 Sussex St., Ottawa	Barred Plymouth Rocks.
Oke, Richard, Box 361, London	Partridge Cochins, R.C. Leghorns, Creve-Coeurs, LaFleche, Hamburgs, Bantams.
Osborne, W. M., Box 472, Brockville	S.C. Black Leghorns, Black Minorcas.
Palen, R., 107 Arlington Ave., Ottawa	Rhode Island Reds.
Partlo, H. W., Ingersoll	Light Brahmas.
Peaker, H. M., 75 McKay St., Ottawa	Black Minorcas.
Peaker, Morley, 75 McKay St., Ottawa	Buff Cochins.
Pillar, Chesley, Russell	Turkeys.
Pranschke, W. C., 86 Concord St., Ottawa.	Columbian Wyandottes.
Pringle, John, 187 Wortley Road, London	Barred Plymouth Rocks.
Pritchard Bros., North Wakefield, Que	Light Brahmas, Buff Cochins, Langshans, Games, Leghorns.
Rawlings, E. A., Forest	Orpingtons.
Readwin, A. & T., 236 Paisley St., Guelph	Leghorns, Pigeons.
Reason, J. F., Ottawa West	R. C. Rhode Island Reds.
Reid, W. H., 35 Union St., Kingston	Cochins, Langshans, Wyandottes, Javas, Games, Leghorns, Orpingtons, Dorkings, Houdans, Game Bantams, Bantams, Ducks, Pigeons.
Reid, Emmet, Almonte	S. S. Hamburgs.
Ridler, L., Guelph	Pigeons.
Robertson, Geo., Box 242, Ottawa	Plymouth Rocks, White Wyandottes, Javas, Games, Leghorns, Spanish, Andalusians, Dorkings, LaFleche, Faverolles, Polands, Ducks, Belgian Hares.
Roger, R. M., 457 Metcalfe St., Ottawa	Black Minorcas.
Rolland, Jean, Mont Rolland	Barred Plymouth Rocks.
Rook Bros., Prescott	Game Bantams.
Russell, Jos., 1308 Queen St. East, Toronto	Wyandottes, Rhode Island Reds.
Scott & Milroy, Athens	Wyandottes, Leghorns, A. O. S. V. Fowls.
Shaw & McIntosh, Forest	Bantams.
Sheward, Bert, 133 Neeve St., Guelph	Pigeons.
Slessor, W. J., 520 Adelaide St., London	Bantams.
Slinn, W. H., 208 Patterson Ave., Ottawa	Orpingtons.
Smith, Bert, Brockville	S. C. Brown Leghorns.
Snelling, W. H., Rockcliffe Park, Ottawa	Orpingtons.
Snetsinger, Jas., Eamers Corners	Dark Brahmas, Plymouth Rocks, Wyandottes, Javas, Leghorns, Pekin Ducks.
Stagg, Frank, St. Catharines	Buff Leghorns.
Stewart, A M., Dalmeny	Plymouth Rocks.
Stiles, Rev. T. J., Cornwall	White Wyandottes.
Taylor, C. M., Lyn	Buff Wyandottes.
Teale, W. J., 21 McTague St., Guelph	Game Bantams.
Thompson, A., Allan's Corners	Turkeys, Geese, Ducks.
Tilden, Jas. L., Clayton	Barred Plymouth Rocks.
Tomalin, Jos., 593 Ossington Av., Toronto	White Plymouth Rocks, Black Minorcas.
Tooker & Bowey, Brockville	Cochins, Wyandottes.
Tozer, H. R. K., 509 Richard St., London	Black Cochins, White Plymouth Rocks, Games, Game Bantams, R. C. Brown Leghorns, Bantams.
Wales, F., Milton	Partridge Cochins, Langshans, S. C. White Leghorns, A. O. S. V. Fowls, Bantams.
Warrington, J. H., Cornwall	Creve-Coeurs, LaFleche Polands.
Westbury, Frank H., 920 Elias St., London.	Barred Plymouth Rocks.
Wheadon & Pearson, 146 London Rd., Guelph.	Rhode Island Reds, Minorcas, Hamburgs, Game Bantams, Bantams.
Wilson, C. H. Hawkestone	Partridge Cochins, R. C. Brown Leghorns, Silver Grey Dorkings.
Wyatt, Hugh, London	Buff Cochins.
Zavitz, L. V., 81 Fourth Ave., Ottawa	Black Minorcas, S. Sebright Bantams.

MEMBERS OF THE ONTARIO HORSE BREEDER'S ASSOCIATION FOR 1909.

Through Canadian Shire Horse Association.

Allen, Geo., Paris.
Blake, Jos., Clinton.
Breckon, John, Appleby.
Burr, John F., Waubuno.
Cornell, Geo., Lyn.
Devins, J. A. Kleinburg.
Drury, Frank, Charing Cross.
Evans, W. J., Lawrence Station.
Fletcher, Jos., Oxford Mills.
Gardhouse, C. S., Humber.
Gardhouse, J. M., Weston.
Gardhouse & Sons, John, Highfield.
Geary, C. K., St. Thomas.
George, H. E., Crampton.
Hogate, J. B., Weston.
Homer-Dixon, Mrs., Niagara Falls South.
Laking, Wm., Haliburton.
Lee, John, Hockley.
Morris & Wellington, Fonthill.
Neil & Son, F. H., Lucan.
Pearson & Son, Wm., Hamilton.
Pye, Thos., Woodstock.
Reid, Archie, Jarratt's Corners.
Sexsmith, M. W., Ridgeway.

Through Canadian Hackney Horse Society.

Allison, J. Wesley, Morrisburg.
Beith, Hon. Robert, Bowmanville.
Boag & Son, John A., Ravenshoe.
Brooks, E. W., Stirling.
Butler, W. E., Ingersoll.
Graham Bros., Claremont.
Graham Renfrew Co., Bedford Park.
Hassard, T. H., Millbrook.
Hodgkinson & Tisdale, Beaverton.
Hogate, J. B., Weston.
Larkin, John D., Queenston.
Mercer, Thos., Markdale.
Oak Park Stock Farm, Brantford.
Sorby, O., Guelph.
Spencley, H. J., Box Grove.

Through Canadian Thoroughbred Horse Association.

Cohen, Ralph, H., Amigari.
Crittenden, Thos. H., Toronto.
Doane, Fred, 631 Yonge St., Toronto.
Hare, John, Toronto.
Hendrie, Geo. M., Hamilton.
Hendrie, William, (Estate), Hamilton.
Ibister, J. Roy, Hamilton.
Kilgour, James L., Hamilton.
McKenzie, A. W. I., Toronto.
Presgrave, Captain W. F., c/o W. Harper, McKinnon Bldg., Toronto.
Seagram, Jos. E., Waterloo.
Webster, Dr. R. E., Ottawa.

Through Canadian Clydesdale Horse Association.

Adams, Chas. A., Brantford.
Agar, Robert, Nashville.
Augustus, C., Brooklin.
Aitchison, And., Guelph.
Alsop, Jos., Glasgow.
Alton, A. P. & Son, Appleby.
Anderson, John, Omemee.
Anderson, Jos. T., Kincardine.
Annan, And., Dunbarton.
Annett, W. B., Walnut.
Annis, Edward, Solina.
Annis, Geo. F., Courtice.
Arbogast, Peter, Sebringville.
Armstrong, John, Motherwell.
Armstrong, Robert, Strongville.
Armstrong, Thos., L'Amaroux.
Armstrong, T. H., Kinburn.
Armstrong, Wm., Locust Hill.
Ashford, Jas. E., Ryckman's Corners.
Attridge, G. A., Clachan.
Baker, Allan, Alberton.
Baker, Ira, Cainsville.
Baker, Thos., Solina.
Balsdon, John I., Markham.
Baptie, Jas., Springville.
Barclay Bros., Barclay.
Batty, W. F., Brooklin.
Bawden & McDonell, Exeter.
Bean & Son, Chas., Brinsley.
Beare, Jno. S., Cedar Grove.
Beattie, J. J., Mt. Brydges.
Begg, W. A., Tiverton.
Beith, Hon. Robert, Bowmanville.
Bell & Son, Geo. A., Lowville.
Bell, W. M., Springford.
Bell, Wm., Avonton.
Bennett, C. R., Russelton.
Bennett, Delbert, Russelton.
Black, John, Kilsyth.
Blanchard, W. F., Newmarket.
Boag, A. W., Queensville.
Boag, H. G., Barrie.
Boag & Son, John A., Ravenshoe.
Bond, S., Columbus.
Borland, J. G., Claremont.
Boules, Levi S., Springville.
Boyes, John, Jr. Churchill.
Boyle, Wesley, Kinlough.
Boynton, W. G., Victoria Square.
Brady, Thos., Chatham.
Brecken, Thos. H., Orangeville.
Bright, John, Myrtle Station.
Bright, Wm., Raglan.
Brock, Wm., Winchelsea.
Brodie, G. A., Bethesda.
Brown, A. C., Epson.
Brown, John, Galt.
Brown, L. A., Fergus.

Through Canadian Clydesdale Horse Association.—Continued.

Brown, Wm., Milliken.
Bruce, Jas., Egbert.
Bunker, S. C., Pickering.
Burgess, Wellington, Norwood.
Burgess & Sons, Wm., Wallaceburg.
Burk, T. W., South March.
Burlingham, D., Wellington.
Burnett, Jos. Elgin Mills.
Burnett, Wm. R., Markdale.
Burns, David, Brooklin.
Burr, J. F., Waubuno.
Butler, W. E., Ingersoll.
Cairns, Thos., Dublin.
Calvert Bros., Buttonville.
Cameron, C., Etobicoke.
Cameron, J. Robinson, Hamilton.
Campbell, Jas., Bellwood.
Campbell, John, Harriston.
Campbell Bros., Alvinston.
Cargill & Son, H., Cargill.
Carstairs, D., Bomanton.
Chapman Bros., Kerby.
Christie, Peter, Manchester.
Cinnamon, John. Oshawa.
Clark, J. L., Norval.
Clarkson, R., Malton.
Clemens, A. E., Tyrone.
Coates, Jas., Shirley.
Cochrane, Geo, Enfield.
Cockburn, W. L., Cobourg.
Cole, W. R., Tyrone.
Colquhoun, Wm., Mitchell.
Columbus, D., Jarvis.
Conn, Robert, Heathcote.
Connor, J. W., Grant River.
Cooper, Wm., Fergus.
Cordiner, John, Ennotville.
Cousins, Robert, Whitby.
Coulson, A. O'Sullivan's Corners.
Coursey Bros., Lucan.
Coursey, T. & C. H., Lucan.
Cowie, G. R., Markham.
Cowie, J. W., Markham.
Cowie, R. B., Derryville.
Cox, Robert, Amber.
Cox, Robert, Huntley.
Coyte & Son, T., Port Hope.
Crago, F. A., Bowmanville.
Craven, John, Brinsley.
Crawford, A. M., Widder.
Crawford Bros., Brown's Corners.
Crawford, Geo., Oro Station.
Crawford, Wm., Carlingford.
Crichton, Jas., Scarboro Junction.
Crowell, Wm., Oshawa.
Culbert, Wesley, Saintsbury.
Dalgety Bros., Glencoe.
Darroch, A. G., Cotswold.
Davidson, Geo., Orono.
Davidson, Jas., Avonton.
Davidson, Jas. I., Balsam.
Davidson, John, Ashburn.
Davidson & Son, Geo., Cherrywood.
Davies, Robert, Todmorden.
Devitt & Sons, I., Freeman.
Dickieson & Son, Guelph.
Dickson Bros., Atwood.
Dingman, W. J., Balsam.
Disney & Son, J. E., Greenwood.
Dix, W. A., Fergus.
Doan Bros., Sable.
Doble, Wm. L., Sunderland.
Doig, Peter F., Fordwich.
Douglas, Alex., Markham.
Downing, H., Simcoe.
Doyle Bros., Mt. Carmel.
Duncan, Thos. G., Woodford.
Dundas, R. D., Springville.
Eadie, A. G., Vars.
Eadie, J. D., Vars.
Eadie, J. R., Russell.
Eaid, C. E., Simcoe.
Elliott, C. E., Mitchell.
Elliott, J. F., Oxford Centre.
Elliott, T. D., Bolton.
Elmore, Ed., Ekfrid.
Esdon, J. H., Bainsville.
Evans, Thos., St. Mary's.
Fairbairn, B., Sharon.
Farris, W. J., Bradford.
Faulds, W. M., Muncey.
Ferguson & Son, J. D., Mapleton.
Ferguson, Alex., Sonya.
Ferguson, S., Conn.
Ficht, Val., Oriel.
Flood, Daniel, Elginfield.
Follis, John, Ashley.
Ford, Geo. D., Galt.
Forgie, John, Claremont.
Forrester, Geo., Gormley.
Forster, W. D., Markham.
Forsyth, G. M., North Claremont.
Fraser, W. G. S., Park Hill.
Freel, J. C., Thamesford.
Fry, Henry, Nobleton.
Fuller, Edward, Mitchell.
Garbutt, Geo., Tullamore.
Gardhouse, J. M., Weston.
Gedcke, J. A., Fordwich.
Gibson, T. A., Wroxeter.
Gilles, John, Marden.
Gleeson, Jas. J., Markham.
Good, E. H., Richmond.
Gordon, John, Brooklin.
Gormley, A. G., Unionville.
Graham Bros., Claremont.
Graham, Geo., Weidman.
Graham, John, Udora.
Graham, John, Derry West.
Graham, T. J., Uxbridge.
Graham-Renfrew Co. Ltd., Bedford Park.
Grant, R. H., Hazeldean.
Grant, Ryerson M., Bradford.
Grant, Wm., Markham.
Gray, Wm., Mayfield.
Gray, Jos. & Wm., Londesboro.
Greenless, Hugh, Bowmanville.
Gregg, Thos., Claremont.
Groat, Chas., Brooklin.
Grundy, R., Clandeboye.
Gunn & Son, D., Beaverton.
Hahn Bros., Hawkesville.
Hales, Jas. J., Chatham.

Through Canadian Clydesdale Horse Association.—Continued.

Hall, Nelson, Rockford.
Hall, Wm. G., Birnam.
Hamilton, Angus, Ravenshoe.
Hamilton, John, Lisgar.
Hand, Jas., Tancred.
Hanlon, Henry, Rayside.
Harris, Leamon, Mt. Elgin.
Harris, Wm., Cattle Market Annex, Toronto.
Hartin, Chas., Stittsville.
Hassard, T. H., Markham.
Hastings, Ed., Almira.
Hayes, Geo., Columbus.
Helmkey, W., Armadale.
Henderson, A., Jerseyville.
Henderson, Geo., Keady.
Henderson, Jas., Belton.
Hepburn, Wm., Foley.
Herold, P., Tavistock.
Hickling, A., Minesing.
Hodgins, W. T., Hazeldean.
Hodgkinson & Tisdale, Beaverton.
Hogate, J. B. Weston.
Holtby, J. W., Manchester.
Holtby, R. M., Manchester.
Holtby, W. E., Brougham.
Holtby, W. W., Manchester.
Hoover, Isaiah, Stouffville.
Hosken, A. E., Cobourg.
Howard & Son, J. W., Amber.
Howard & Son, W. J., Concord.
Howden, T., Milton West.
Howitt, Jas., Altona.
Hume & Co., A., Menie.
Hummason, F., Embro.
Hunter, J. C., Danforth.
Hutchinson, John, Millbrook.
Innies, Alex., Clinton.
Innies, Alex., Brooksdale.
Innes, Jas. W., Woodstock.
Ironside, H. W., Puslinch.
Isaac, Alex., Cobourg.
Jackson, Henry W., Glen Allen.
Jackson, Richard, Alma.
Jackson & Son, Geo., Downsview
Jenkins, Jas., Oshawa.
Jewell, W. E., Bowmanville.
Johnston, Arthur, Greenwood.
Johnston, John, Cobblehill.
Johnston, John, Woodbridge.
Johnston, J. R., Springford.
Kelly, Jas., Fairview.
Kennedy Bros., Marden.
Kennedy, Michael, Pickering.
Kennedy, Wm., Nobleton.
Kent, Robert, Embro.
Kester, Orvil, Stouffville.
King, Frank, Fingerboard.
King, Marmaduke, Fingerboard.
Kissock, Samuel, Guthrie.
Kneeshaw, J. J., Bradford.
Knister, Elmer, Ruscomb.
Knox, Andrew, Tuscarora.
Kydd, Wm., Uxbridge.
Lamb, Geo. H., Tancred.
Langton, Thos., Braemar.
Larkin, J. D., Queenston.
Lavin & Richardson, Harriston.
Law & Son, Wm., Ringwood.
Lawrie, John, Malvern.
Leahy, Wm., Sunderland.
Leathers, W., Bethesda.
Lehman, A. B., Atha.
Leonard, Jas., Schomburg.
Leonard, W., Craigvale.
Lester, Ellory, Forest.
Lindsay, Jas. A., Fergus.
Lougheed, H. P., Heathcote.
Lowes, J. W., Bethany.
Lumley, Jos. E., Minesing.
Mc Alpine, Angus A., Edy's Mills
McArthur, Alex., Oro Station.
McArthur, A., Holiday.
McAvoy, C. C., Atha.
McBeth, D. G., St. Paul's Station.
McBrine, R., Chatsworth.
McCabe, J. A., Collingwood.
McCaig, Alex. Aberfoyle.
McCorquodale, W. M., Bennington
McCowan, Jas., Brown's Corners.
McDiarmid, P. A., Alvinston.
McDonald Bros., Woodstock.
McDougal Jas., 57 Adelaide St. Toronto.
McDougall, Silas, Edgeley.
McEachren & Son, P. R., Eldon
McEachren, R., Argyle.
McElheron, Neil, Chatsworth
McEwen, Jas., Clifford.
McFarlane, Jas., Claremont
McFarlane, John, Dutton.
McGavin, J. J., Leadbury.
McGeachy, A. & D., Dutton.
McGeachy, D. & R., Coleraine.
McGregor, Alex., Uxbridge.
McIntyre, Alex., Cathcart.
McIntyre, Sharzel, St. Mary's
McKay, Hugh, Embro.
McKee, Alex., Sandhill.
McKeign, Colin, Strathroy.
McKenzie, John, Chatsworth.
McKinnon & Sons, D., Hillsburg.
McKinnon, G., Unionville.
McLevin, John, Hickson.
McMichael, T., Seaforth.
McMillan, John, North Keppel.
McMillan, R. J., Seaforth.
McNeilage, Jas., Eberts.
McNiven, A. F., St. Thomas.
McPhail, Neil, Sonya.
McPhee, H. H., Park Hill.
McTaggart, Jas., Sonya.
McTavish, Alex., Shakespeare.
McTavish, John, Shakespeare.
McVey, J. F., Metcalfe.
Mackey, Robert, North Gower.
Mackintosh, Wm., Burgoyne.
Mair, Jas., Peabody.
Major Bros., Whitevale.
Maloney, Patrick, Metropolitan.
Martin, Robert, Wexford.
Martin, T. H., Duncrief.
Mason, Leslie, L'Amaroux.
Matthewson, J., Brooklin.

Through Canadian Clydesdale Horse Association.—Continued.

Maxwell, Jas., Locust Hill.
Magill, Chas. L., Aurora.
Meharey, Wm., Russell.
Menzies, J. A., Wingham.
Mercer, Thos., Markdale.
Meyer, Frederick, Bethesda.
Meyers, Jacob S., St. Clements.
Middleton, G. & W., Claremont.
Miller, John J., Gowrie.
Miller, Robert, Stouffville.
Milne & Sons, R., Green River.
Milroy & Son, John, Cedar Grove.
Mitchell, J. R., Whitby.
Mitchell, Robert, Ivan.
Moffatt, Jas., Teeswater.
Moffatt, R. N., Fenelon Falls.
Montague, N. C., Jarvis.
Mooore, T. J., Kilsyth.
More, Jas., Kirkton.
More, W. R., Almonte.
Morgan, D. M., Claremont.
Morrison, J. D., Argyle.
Morrison, Peter, Argyle.
Mossip, Wm., St. Mary's.
Mountjoy, F., Enfield.
Munroe, Jno. A., Argyle.
Murison, Jas., Cedar Grove.
Murray, Alex., Palmerston.
Murta, J. J., Uxbridge.
Myles, C. E., Bedford Park.
Myles, Jas. A., Heathcote.
Neil & Sons, F. H., Lucan.
Newman, Robert, Bognor.
Nichol, Geo., Waubuno.
Nichols, R., Hagersville.
Noyes, Wm., Denfield.
O'Brien, T. R., Ponsonby.
Ogle, Ryerson, Blytheswood.
Oliver, W. R., Cobourg.
O'Neil & Co., London.
Ormiston, R. W., Cresswell.
Ormiston & Sons, Columbus.
Osborne, T. C., Whitby.
Pallett, Wm., Summerville.
Palmer, D. R., Thorndale.
Parker & Son, Thos., London.
Paton, Jas., Swinton Park.
Patterson Bros., Millbrook.
Patterson, John W., Denfield.
Patterson, En. Norwood.
Paxton, P. G., Tottenham.
Payton, Bernard, Conroy.
Peterson, Alex., Hawkesville.
Pettit & Sons, Freeman.
Pettit, R., Glenwillow.
Pinkerton, D., Pinkerton.
Plunket, Robert, Woodbridge.
Porter, Thos. H., Brooklin.
Potts, O., Simcoe.
Power, Truman, Bowmanville.
Prouse, S. J., Ingersoll.
Prout, Geo., Cedar Brae.
Pugh, W. D., Claremont.
Purtill, James, La Salette.
Quinlan, David, Ennismere.
Rae, Walter, St. Paul's Station.
Ramsay, W. J., Mongolia.
Ratcliffe Bros., Anderson.
Reeson, Herbert, Columbus.
Reid & Co., R., Hintonburg.
Reynolds, Fred., Enfield.
Richardson, Fred, Columbus.
Richardson, Jas., St. Paul's Station.
Richardson, F. P., Columbus.
Richardson, Wm. P., Columbus.
Roadhouse, Silas, Comber.
Robertson, A. J., Shakespeare.
Robinson, Wm., Markham.
Robinson & Son, Mrs. J. W., St. Mary's.
Robson, Jos., Telfer.
Rock, Thos., South March.
Ross, Dugald, Streetsville.
Ross, J. C., Jarvis.
Ross Bros., Nairn.
Rossiter, A., Crampton.
Rothwell, B., Ottawa.
Rundle, D., Sonya.
Schaefer, H., Maplewood.
Scharf, A., Cumming's Bridge.
Schell, M. & W., Woodstock.
Scott, Francis, Twin Elm.
Semple, Hugh, Hereward.
Sewell, David, Cedar Grove.
Sharpe, T. H., Brampton.
Shaw, Philip, Madina.
Shields, J. B., Mount Albert.
Shier, R., Cannington.
Sleightholm, J. A., Humber.
Sloane, A. C., Bradford.
Slugget, J. W., Mount Horeb.
Smart, Jas., Beeton.
Smilie, A. G., Hensall.
Smith, L. J., Manchester.
Smith, Neil, Brampton.
Smith & Richardson, Columbus.
Sorby, O., Guelph.
Spear, Thos., Cobourg.
Spearin, Geo., St. Mary's.
Spencer, C. H. J., Beaverton.
Sproule, Newton H., Schomburg.
Staples, Geo., Lifford.
Staples, Jos. F., Ida.
Stewart, John, Springbank.
Stewart, Robert, Winfield.
Stocks & Son, Jas., Columbus.
Story, Harry, Picton.
Story & Son, R., Crossland.
Stringer, Abe., Kingarf.
Summerfeldt, L., Unionville.
Tape, Frank, Highgate.
Taylor, Anson, Blackstock.
Taylor, Geo. B., Middleville.
Taylor, L. W., Stayner.
Taylor, Wm., Baldwin.
Thompson, Andrew, Watford.
Thompson, John, Belwood.
Thompson, Nathaniel, Orangeville.
Timmons, A. C., Winchester.
Tingle, Geo. A., Ellesmere.
Trachell, Fred, Shakespeare.
Tran, W. H., Cedar Grove.
Tremble, Geo., Bowmanville.
Trick, R., Unionville.
Trott & Son, Ed., Christina.

Through Canadian Clydesdale Horse Association.—Continued.

Underhill, Jas., Claremont.
Vance, David, Tavistock.
Vipond, John, Brooklin.
Wagg, Nelson, Claremont.
Wagg, Vincent, Unionville.
Wagster, Wm., Tavistock.
Wagg, Jas., Stouffville.
Walbrook, Wm., Hagersville.
Wallace, Geo. A., Ponsonby.
Walton, Guy, Ellesmere.
Ward, Edward, Greenbank.
Warner, Peter, Homer.
Watson, T. H., Sonya.
Watt, Robert, South March.
Watt, R. A. & J. A., Salem.
Way, R. G., Trenton.
Webster, Jas., Oakwood.
Webster, W. W., Lindsay.
Wells, A. B., King.
White, Geo., St. Mary's.
White & Sons, R., Linton.
White, Job, Ashburn.
White, T. & S., Birr.
Whiteway, G. G., Seagrave.
Whetstone, Jos., Kintore.
Wilkin, W. G., Harriston.
Wilson, Jas. A., Elginfield.
Wood, T. A. Bradford.
Wood, Wm., Bradford.
Woodill, Wm., Woodill.
Woodley, Wm., Dundas.
Woodward, Thos., Derryville.
Wyckoff, J. G. & E. L., Tyrell.
Yake, P., Kintore.
Young & Son, Wm., Mt. Brydges.
Young, W. H., Binkham.

FOURTH ANNUAL REPORT

OF THE

POULTRY INSTITUTE

OF THE

PROVINCE OF ONTARIO

1909.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., *etc., etc., etc.,*
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present herewith for the consideration of Your Honour the Report of the Poultry Institute for 1909.

Respectfully submitted,

JAMES S. DUFF,
Minister of Agriculture.

TORONTO, 1909.

CONTENTS.

PAGE.

Methods of Trussing and Packing Chickens for Market: MISS YEATES - 5

Address: G. C. CREELMAN, B.S.A., M.S - - - - 15

Illustrated Address: T. F. McGREW - - - - - 20

"Liver Disease" and "White Diarrhœ": DR. GEO. BYRON MORSE - 21

Poultry in Eastern Counties: VICTOR FORTIER - - - - 35

Profitable Poultry Farms: C. K. GRAHAM - - - - 44

Illustrated Address: C. K. GRAHAM - - - - - 52

Address: G. A. PUTNAM - - - - - - 54

Raising Chickens: WILBUR BENNETT - - - - - 60

Poultry Raising: L. A. MARTIN - - - - - 64

How to Succeed With Poultry: T. F. McGREW - - - - 68

Poultry Raising: L. H. BALDWIN - - - - - 77

Illustrated Address: Dr. G. B. MORSE - - - - - 81

Poultry Institute.

The annual meeting of the Poultry Institute and the Ontario Branch of the American Poultry Association was held at the Ontario Agricultural College, Guelph, on the 8th, 9th, 10th and 11th of February, 1909.

Mr. L. H. Baldwin, of Toronto, occupied the chair at all the meetings, which were started promptly on time, and the meetings were characterized by general discussion on every subject that was presented. There was a larger attendance than at any previous meeting of the Poultry Institute. At the first meeting, standing room only was available for some who came in a few minutes late. In opening the meeting the chairman said: "I do not know that it is necessary for me to open your Poultry Institute with any lengthy remarks. We have had two or three years' experience in Poultry Institutes and we know the practical good we can get from them. We have not started our meetings in former years promptly on time, but during this week I intend to open our meetings at the advertised hour. We all appreciate the great work Professor Graham has done in getting the speakers together, that he has on the program for this occasion. These speakers have come 'chuck full' of information, and it is the duty of the audience to get all the information these gentlemen have out of them. They will tell you a great deal in their addresses, but there is a good deal more that they can tell you if you will only ask questions. Therefore, I would advise you to be ready with your questions as soon as the speaker is through.

METHODS OF TRUSSING AND PACKING CHICKENS FOR MARKET.

By Miss Yates, O.A.C., Guelph.

I would like to say a few words to you about table poultry generally, before taking up the demonstration work. It may seem a little unkind, and I hope it will not bore you at an exhibition of live birds, to say something of what is below the feathers. It has been a disappointment to me not to find better birds to eat in this country. In the Old Country a very fine quality of birds is exhibited at the big shows, such as the Smithfield Fat Stock Show and the Dairy Show, not forgetting big local shows in the counties. In Canada you seem to pay more attention to eggs and laying strains, but the culls from laying yards and the sweepings of the fancier's loft can never be marketed as high class table poultry. Here in the city of Guelph, where there is such an admirable show of dead poultry, it is hard to realize that throughout the Province poor stock is put on the market, and in bad shape too. It seems to me that it is not generally understood that all birds will not make good eating. Just think of the different types shown in the human races, and you will realize something of what I mean. In this country many people are a prey to nervousness and indigestion, and we see numbers of lean, active, individuals walking about. Canadians might almost be compared to the Arabians and other active nations of the world. Then recall the appearance of the comfortable, stout Germans, and the fat fleshy Englishmen, and don't you agree with me that they would make rather better eating than the average Canadian, if you had to eat human beings? (Laughter and applause.) Of course, I am well aware of the jokes you get off on the "greedy Englishman," but it is a fact that some races are plumper than others. We see the same thing in the different races of cattle; some will put on flesh more readily than others. In speaking in the beef district the beef men understand what I mean, but the dairymen do not apply the information so readily.

In poultry we get first of all the laying or non-sitting varieties, and these are the birds out of which you cannot make the best table meat. They are lean, active birds, and they give a good many eggs a year, but they do not put on the quantity of breast meat. Those who cater for export trade should know that most of the European nations like the white meat better that the dark meat. In Canada frequently people ask for the dark meat. In Europe, however, delicate, well-flavored breast meat, is required, and a bird is judged by the quality and quantity of muscle on the breast, so that when you ship great consignments of yellow fleshed, skinny breasted birds to the old country, you are likely to get very poor results.

The second great group represents table birds. The Dorking is possibly the ideal we should try to aim for, but it is not a very easy bird to raise under all circumstances, as it does not do well on damp soil or clay. The type I am alluding to, has the square shape, which gives good development on the breast. The next five names on the chart are French; in France probably the finest table poultry in the world is produced, and the older French races are some of the most valuable there are for that purpose; but I do not advise you to take them up here. La Bresse and La Fleche are very delicate eating, but they require a warmer climate. Some specimens realize for the French poultry women, five dollars apiece, where specially fed and fattened for the tables of Russian Princes.

I have been able to get Faverolles ready for the market in eight weeks. They are the race of birds that the French use to supply the demand for their second rate market and should be better known. They have the beautiful breast of the English Dorking and all the hardiness of the Rhode Island Red. It is a disappointment to me that that bird is not more largely used in this country by those supplying the general demand for table fowls. They do not lay many eggs in a year, but the point I wish to make is this, that in order to obtain the best results you have got to specialize. If you are going to put a quantity of table poultry on the market you must use a table breed.

START RIGHT. To get the best results, you must start right. Having selected the race, you must remember that table birds require different treatment from the beginning. You must give them less exercise and more generous diet. I do not know of a better use to which you can put your table scraps than in feeding them to birds for table use. The wastage from your meals will give excellent results. I remember some years ago, one of the big exhibitors of table poultry came to see me at Lady Warwick's College, and just as he came along, a couple of students passed with two buckets from the college kitchen. We put the cooked material into one bucket and the uncooked into another. The visitor asked, "Is that what you are going to give to your show chickens?" And I said, "Yes, it is," He said, "Then it is no use trying to compete against you." As a matter of fact, fed aright, it is the best kind of food you can give table poultry, if it can be got in large quantities from some hotel or institution. Ordinarily it is hard for the women to get this material for the chickens, because it generally goes to the pigs.

I advise marketing the cockerels early; do not keep them. Get rid of them before Christmas at latest. Many of you market the whole of your stuff in the fall for the Thanksgiving trade, and this is not the very best plan, especially if you are going to work up a special trade. There is a tremendous demand here for good poultry and a good trade can easily be worked up. Your customers must be supplied with what they want during the whole year, and in order to meet that demand all the year round, there must be two or three breeding seasons and some broilers must be raised. These are easily managed and do not require very much different treatment. For your later table chickens, give them two mashes a day from your house scraps in addition to their hopper food and you will find they will get along uncommonly well. I have had the pleasure of helping Miss Beardmore to market broilers for the Toronto Horse Show for two years now, and we were lucky enough to get a dollar apiece for them the first week in May. They must be small, but as plump as partridges, fed in the ordinary way, with two good mashes of bread and milk or house scraps, a day; they were marketed at eight weeks old. When the Horse Show and the races come off in Toronto, there are a great many parties given, and people are of course glad to have dainties to give their guests. There are many people in the rapidly growing cities of this Province who require delicacies for ordinary use, and one does not need to look far for a good market. There is an excellent market springing up in the Province of Ontario, and the home market is the easiest one for an ordinary person to supply.

FLESHING OR FATTENING. We were marketing buff Orpingtons and white Wyandottes as broilers. They do not make the best, but the people were glad to have them. Wheat is a good thing to feed table poultry. The lowest prices are obtained in September, October, and November. The highest price is got in May. If you once establish a reputation for supplying excellent poultry, you will be sought for by first-class hotels, clubs, and private hospitals, and my experience is that they will take all the stuff you can supply. For the spring trade and the early summer months you can secure higher prices from private customers. The French method of feeding is to be preferred for birds in confinement. Ordinarily, they must be supplied with vegetable food of some sort, but if sour milk is used this can be dispensed with. The acid in the milk answers the same purpose as the vegetable acid and keeps the birds in good health. Let the milk sour, then mix your meal into the milk in the proportion of one quart of milk to one quart of meal and let it stand for twenty-four hours to become a creamy, rich consistency. Three-quarters of a pound of fat can be added to a gallon of skim milk, gradually raising the amount to a pound per gallon. In France the milk is bought when it is cheap and stored in pits in the ground until it is required. It does not matter how sour it gets.

Put the birds into crates or coops, and don't give them anything to eat for twenty-four hours. The whole secret of success consists in keeping the birds' appetite keen from the beginning. A teaspoonful of food too much will spoil them. There is an instinct about feeding animals; some people have it by nature, others you can never teach; exactly as there are some women who never learn how to feed their husbands, and some who never make a mistake in cooking. The feeder must understand when the food is right and the birds are enjoying it. We give a quart for eight large cockerels. They get that amount twice a day, the first week morning and evening. It is well to keep the feeding times evenly balanced apart. The birds must be kept quiet and do not allow strangers to be around them; in fact keep all dogs, children, and visitors away. Induce a sleepy, comfortable condition. Do not let them see too much of what is going on around them; do all necessary work at feeding times, take out the birds that are to be killed and clean out the shed then. It is well to darken the shed; keep it shady, cool and quiet. The second week give the birds as much as they will eat and the third week put them on the cramming machine. It is advisable to use a machine, divide the period of 20 days in half, and see that they are kept ten days on the low diet and the other ten days have the full rations. The birds should be killed as soon as they are ready; do not let them go past a certain stage, or you will find it is not economical. There is no difficulty in this business; it can be started at any place, where birds of the right breed are raised. It is a very good plan to induce the neighbors to co-operate and have the birds bred in the same way. I have heard it stated from this platform that it would be a good idea to have a whole neighborhood co-operate in raising Plymoth Rocks for example, and there would be a chance in this way to market an even product and take big orders for wholesale trade. Big buyers can only place orders in such neighborhoods. Birds should be killed where they have been fattened, and they should be fasted for twenty-four hours at least, before being killed.

Fasting Before Killing. These birds before you here have been properly fasted. Notice the flat appearance of the neck. It makes all the difference in the world to the quality of table poultry, if the birds have been fasted until the crop is emptied. I cannot possibly lay too much stress on that. It is positively a revolting sight to go to the poulterers' windows in nearly every town or village in this country and see a number of the birds with the crop distended with food. That is an indication that the whole of the alimentary canal is full of partially digested food, which will become decomposed and give off gases which will set up toxins that affect the quality of the flesh. In fact it has been stated by some authorities that we often market poisonous stuff. A great many producers say, "But then, we lose perhaps three-quarters of a pound of weight if we fast them," This reasoning will never built up a high class business or obtain the best prices for the produce.

Marketing. People tell me that there is a great deal of difficulty in marketing table poultry in the summer months in this country, but I have never had a complaint from any customer, of the state in which the birds have arrived. At one time last year we were shipping as many as six dozen a day, and they all arrived in good shape, because they were fasted at least 30 hours—36 hours even—is none too long in very hot weather. Then if they are killed, plucked, and packed in a cool place, they will arrive all right. We had no special place for doing the work; a cool cellar, was in our opinion, all that was necessary.

Shipping. Then sometimes I hear complaints of the abominable state of the railroad cars, but there is no particular hardship in shipping in this country any more than in the old country. I believe it is because attention is not paid to the fasting before killing and in packing in a cool place that so much loss occurs. Ship if possible by an early morning train.

Now, before I begin to demonstrate, trussing, etc., if there are any questions, I will be pleased to answer them.

The CHAIRMAN: You were speaking about these table breeds; could you tell us anything about their laying qualities?

A.—The Faverolle I mentioned as being particularly admirable for eating, is a shockingly poor layer in most strains I have used, and it lays a wheaten colored egg.

Q.—How about the Dorkings?

A.—They lay a nice looking white egg, but I have never had Dorkings that would lay well in winter.

Q.—Indian Game?

A.—They are not prolific layers. What do you mean by good layers?

The CHAIRMAN: If you have a flock that will average 130 to 140 eggs per annum you have a good laying strain.

Q.—In getting scraps from hotels, is there, first of all, any difficulty in getting the hotel people to treat them properly, and what do you do with the scraps to keep them from getting sour?

A.—Wherever I have been able to get hold of the right kind of material, I have had no difficulty in getting them to classify the material.

Q.—Where I have gotten material from the hotels, everything has been all mixed up. I was liable to get Sapolio. When I did get the stuff it would be sour, and I let it all go to the hogs.

A.—Your experience has not been quite as satisfactory as my partner's. We used to sell our best broilers to one particular club, from which we had the scraps, and most of the broilers used to come back in the scraps. They were entertaining society people who have a few mouthfuls of each course and leave the rest. We found it was uncommon good fare for the chicks.

Prof. GRAHAM: Could you get the people to separate the scraps for you?

A.—In this particular instance they were not specially separated, but in another instance, they gave a man 25 cents to take away the scraps, and I made a bargain with the manager, that we would send for it, if certain things were kept out of it.

Q.—What would your seven weeks' old Faverolles weigh?

A.—As broilers, we like them to weigh three pounds a pair, and we allow a margin of a quarter of a pound, and sometimes they weigh three and a quarter pounds a pair.

Q.—Do you make them weigh that at seven weeks?

A.—Yes, you can do that. You must not make that weight up of bone and skin, either. You can get that weight fairly easily in a rapidly growing bird, but you must try and make it up with flesh.

Q.—How many eggs do you get on an average with your Faverolles?

A.—95 to 100.

Mr. FORTIER: We get 90 to 95. They will lay in cool weather, and they will stand the cold pretty well.

Q.—What kind of meal do you mix with that sour milk?

A.—The best meal I know of is whole oats ground up, if you can get it ground fine enough in this country, hull and kernel. I have used barley meal, corn, and shorts with a cup of low grade flour to bind the mixture.

Q.—What would you do in the United States if you had to have yellow meat and trust to corn meal?

A.—Why, do you not use corn meal? We always put with it low grade flour. It might interest some of you to know how these broilers were fed. They were given nothing at all for the first forty-eight hours; then they were given a feed of grit.

Q.—What grade of grit?

A.—Sharp flint grit; then a mixture of cracked wheat and pinhead oatmeal. That is the cheapest thing I know. You can buy all kinds of beautifully prepared chicken food, but if you can get a little grinder and crack the corn up yourself and sift the flour out of it, that is cheaper. A hopper of beef scrap is before them all the time, and I do not find much difference whether it is wet or dry. I have a small piece of wood with a long nail in it, and I put an apple on the nail and the chicks pick at it. It does not matter if the apple is a little bit rotten.

Q.—Sour or sweet?

A.—An ordinary apple. At the end of the first week, they had two mashes per day. If you can give them warm bread and milk, it answers admirably. We feed these mashes at ten in the morning and four in the afternoon. If you give them table scrap, the cooked material should be dried off with meal. The girls present will understand when I tell them to put their hands into it and mix it up. Do not use barley meal unless it has been sifted. Ground oats will bring them on quicker.

Q.—Do you sift the corn meal and the barley meal?

A.—Sift barley meal; all that extremely husky stuff should be taken out for chicks three weeks old.

Q.—How about the flour meal that you get at the mills that is made from oatmeal?

A.—I do not like that; it makes it too pasty.

Q.—Do you have anything else besides that mash?

A.—If you can give them milk with it, all the better.

Q.—How old are they when they start upon that diet?

A.—Three weeks.

Q.—Do you continue that without any change?

A.—Yes.

Q.—These chicks have a limited range?

A.—Yes.

Q.—How close can you keep them without getting weak legs?

A.—If they are on loose dry litter, they will get a certain amount of exercise. Keep them actively scratching for some of the food. Of course you must not take birds raised upon table poultry methods and try to turn them into stock birds. I am not advising the system for any other purpose but a broiler trade, because their constitutions would be considerably impaired if kept in this way until adult stage was reached.

Q.—What is this Dari meal used in England?

A.—Kaffir corn.

Demonstration in Carving.

Miss Yates then gave an demonstration in carving a cooked bird. In doing so, she said:

Great pains have been taken in cooking that bird to get this attractive appearance. Half the beauty of the bird is lost if it is carved in the kitchen, and so often I have seen a tired woman, who has done all the cooking for a big family, have to set to work and carve the bird before it came to the table.

Put your fork in firmly, rather more than half way down the breast bone, and keep it there till you are pretty well through carving. Take off the wings, then take off what we call the "merry thought" and what you call here the "wish bone." Take off the side bones next, and then remove the breast. The breast is the chief dainty on the bird and should be given to the guest of honor. If the breast does not easily yield, make a cross cut each side through the ribs. You can take two or three slices from the side of the breast if you wish; otherwise you should give it to anyone as it is.

Q.—Supposing the guest thinks the breast meat too dry?

A.—In the old country, they always give the white meat to guests and dark meat is generally used in the kitchen.

Prof. Graham: It is on account of their not feeding milk here that the breast is sometimes dry.

The back should never be given to anybody. I am supposing you are entertaining a party of people whom you wish to honor. You should not give the drum-stick either unless you are obliged to do so. It is not a choice piece to give anybody, but for an ordinary family gathering, I think the boys might get it. If you are obliged to give some dark meat this first joint of the leg, may be used. In the old country as a rule these pieces of the bird would be reserved and grilled for breakfast. They would not be served up at the party at all.

Q.—Would it be considered good form to stand while carving at a dinner?

A.—No, you would have them carved on the side.

Q.—Supposing this were a grand function, and the carving was being done at the table, would you stand?

A.—If the hostess were a lady and she were doing the carving, I have seen it done standing.

Q.—What is the most necessary thing in carving?

A.—I should say patience and an unselfish disposition, that would enable you to give the best pieces to the other people.

Trussing.

See what a nice breast this bird has. I do not think it will make tough eating.

It is a good thing, first of all, to remove the sinews from the legs, and then these drum-sticks, that we have been talking about, do not present such a great problem to those who are going to eat them. I am supposing the bird has been singed. If you singe them before shipping use methylated spirits, do not use straw or paper, the flame from which is apt to smoke the flesh. Pass the bird through the flame once each way to get rid of these rudimentary feathers which look so much like hairs.

Q.—Do these show on a yearling?

A.—Yes, they will show.

Q.—How old is a fowl if they do not show?

A.—We do not like to eat them very old. It is customary in some markets to leave a little ruff of feathers around the leg, and that has to be removed before you fix the bird for the table. It is also customary to leave on some wing feathers but in these days of difficulty in getting good servants, it will pay you to prepare the birds before shipping to private customers, and if you do so, the giblets should be put in a piece of butter paper and the birds should be wrapped separately in butter paper and then placed in a basket, and they will travel any distance easily.

In order to take out the sinews, have the head of the bird towards you, make a slit down the sides, insert the trussing needle and twist it around several times, and pull hard, as you would in drawing a cork. The older you think a bird is, the more you should twist upon the needle, and then pull as hard as you can. The removal of these tough sinews makes it considerably better eating.

You should have a knife with a strong blade that will not give. Take off, first of all, the wing tips. Also remove the flap of skin, that supports the quill feathers. It is not a nice thing to get upon your plate, and it should be trimmed off at this stage in the proceedings.

The next thing to be done is to take out the neck. Reverse the bird, make a cross cut just at the point where the feathers cease. Make a narrow slit right down the back of the neck of the bird, until you expose these two white marks, at which point the neck will come off more easily than any other.

The neck is a useful part of the bird from which to make gravy. But it should never appear on the bird at the table. In the method of killing that I adopt (by dislocating the neck) the neck would draw right off because I should have snapped it to begin with, but in your method of killing (bled) you have to make another cross cut to get the neck out.

I am now going to remove the crop. To do so begin by inserting the thumb at the end of the flap of skin, do not begin at the crop itself. Above all things get all the crop out. It is the most disagreeable thing in the world to get an oat or two on your plate.

The next thing is to loosen the lungs, and if you do that thoroughly from the neck end, you will find it will be considerably easier to draw the intestines. Allow your middle finger to clear off the material below the lungs until you can feel the ribs. Insert your middle finger below the breast-bone and work the bird gradually around until you feel a spongy substance below your finger. Then hook the fingers in it and draw it out smartly. Make a cross cut between the vent and the tail, and draw out the end of the trail. This bird is singularly fat and we can just get in the knife and cut out the end of the trail in that way. This fat will give you a better flavor for the chicken than any other kind of fat you can use for roasting. It is also very much appreciated in hospitals where they make salve out of chicken fat. It will heal sores sooner than anything else. I had an order at one time from a London Hospital for all the chicken fat I could let them have.

Put your fingers through the opening until you feel the gizzard in your hand, then pull gently but firmly, and the whole of the entrails will come out with one pull. The heart should be sent with the neck, so should the liver if it is in a fit state, and the gizzard is always sent.

Dr. Morse: You have drawn that bird in such a clean manner that I do not think there would be any tainting of the fowl's flesh from the entrails. Complaints have been made that in drawing the fowl, the flesh becomes tainted and that the taint is retained during cold storage, and results in putrefaction.

A.—For our best customers in England, it is customary to remove this wish-bone or merry-thought to enable the butler in carving to cut a continuous number of slices. It is well to crack the bone at the root of the neck.

This needle I am using is an ordinary packing needle. I do not know whether you can procure trussing needles here or not, but you can buy these packing needles at any hardware store. Introduce the point of the needle as low down as you can in the thigh, but over the bone, and let it come out in exactly the same position on the other side. Roll the bird over, take a cross position through the wings, reverse the position for the other wing and you come out opposite where you went in, then tie the string as tightly as you can. The second string is put in simply to tie the hocks down to the tail. This string is put in through the two holes that are in the back of the bird. In the old country, if it is a spring chicken, the toes only are taken off, and the other part of the foot is left on, for an older bird we take off the foot just mid-way, and there is a reason for that. If you take off the foot at the joint, you will find that in cooking, the flesh will frequently shrink up the bone and a great piece of the bone will be exposed when the bird comes on the table. Suppose this bird is shipped to your customer trussed and the cook wishes to put in dressing, she draws out this flap of skin and the dressing is put in there to make the bird to resemble a little turkey, and the remainder of it is made into balls and put around the bird on the dish when it comes to the table.

The dressing we use is that advised by Mrs. Marshall, the famous cook in London, England, which is:—8 oz. bread crumbs that are stale and white; 4 tablespoonsful parsley chopped fine, very fine; 4 tablespoonsful sweet herbs, marjoram and thyme, no sage; 2 tablespoonsful butter or chopped bacon or fat; 4 whole eggs. Just break the eggs in whole and mix them up with the mixture; 2 tablespoonsful salt; 1 tablespoonsful black pepper. Mix all up together and use. That should be enough for two chickens.

KILLING.

In case you should be afraid that the bird will not be dead because you will see a certain amount of muscular action after it has been killed, let me say the bird is dead, as soon as I snap the neck. Take hold of the neck, with the little finger placed below the beak, and snap the joint down and back at the same time and it is all over. It is a good plan to allow the wings to flap a little. That helps the passage of the blood into the neck and drains the bird as effectually as it would be drained by bleeding, and yet you get none of the disagreeable experience of seeing the blood dropping in every direction. (Miss Yates then plucked the bird.).

MR. MCGREW: The question of cold storage for poultry has been discussed all over the United States, and I say that just as soon as putting dressed poultry into storage is stopped, just so soon will the poultry interests of the United States be ruined. If the United States government would spend the time in trying to teach the people not to kill the chicken until after it has fasted for thirty hours, instead of agitating against cold storage, it would be of more benefit to the people.

There are eighty-five million of people in America, and six or eight millions in Canada, and it would be utterly impossible to keep food for these people if it was not for cold storage, and thousands and thousands of people living in New York city would not be able to get eggs. I kept a turkey three years in cold storage, and I was invited to help eat one that had been in storage for five years. I did not get there, but the five gentlemen who did, said that if they had not been told that it was in five years, they would not have known it had been in storage longer than one year. I have eaten turkeys that have been in storage sixteen or eighteen months. I would rather have the flavor of one that had just been killed, but they are good food. I think the fault is in the fowls before they get in cold storage and not after.

MISS YATES: It is peculiar thing that we have to listen to statements of that kind repeatedly in the present day, just for the lack of common sanitary precautions, which one wishes that all would practise.

MR. MCGREW: People who can pay $1 per dozen for eggs and $5 for a chicken will take care of themselves. It is the people who want cheap food that we have to look after. The people who live in large cities and who cannot pay the big prices.

THE CHAIRMAN: After killing do you cool birds by artificial methods?

MISS YATES: No, we have only had an ordinary cellar to pack our birds. It is a well ventilated cellar; the shaping board should be in the cellar.

The birds should be packed in as cool a temperature as possible, and the best package I know of for shipping poultry is a meat basket. You can get them in many different shapes, some of them are wider than others. Put some clean paper in the bottom and sides of the basket, lay the birds on their sides. Pack them so that the breasts face each other. By packing in this way, you get a criss-cross pattern of the wing feathers all down the centre of the basket which is attractive looking. Do not have more than two layers in a basket. Then put a piece of paper on top and cover with a piece of sacking and sew down with a packing needle.

Q.—Is that basket heavy enough to hold two dozen fowl?

A.—This type of basket is.

Q.—How far do you ship them?

A.—From Jarvis, in Norfolk county, to Toronto, about 130 miles.

Q.—Is the flesh of the chicken improved by keeping it?

A.—I do not care for a chicken until a day or two after it has been killed. I consider they improve for a week at least.

Q.—Would you want to eat that chicken you have just killed, to-night?

A.—I would not. You must be careful to get all the animal heat out of the bird before you pack. If you kill a chicken and then cool it in cold water and fry it, it is all right to eat the first day.

THE CHAIRMAN: These birds you see on this shaping board have been killed and plucked by the students of the Short Course in Poultry here and you can see what they can do with very little training.

BONING. Anyone can bone a chicken. There is nothing at all difficult in doing it. It is just a question of patience and keeping at it. Take a small knife and make a slit right down the back, and proced to scrape until you free the sinews that attach the wings to the bones. Cut these sinews and proceed to scrape, scrape, scrape, until you can get the wing bones out. Scrape the carcass until you draw the bones out in the same way. As you scrape the flesh will gradually turn over until you have the bird inside out.

Q.—How long would it take you to do that?

A.—It takes some time. I have not had occasion to do a great many, and I cannot do it within an hour. The young domestic science students that the Department sends out with me, sometime take an hour and a quarter, to an hour and a half. It is a very tedious thing to watch. That is all there is to do, scrape until you get it free.

Q.—Why did you put the liver of this bird in the pail.

A.—Because it was not fit to use. I would not use it unless it was a bright red and not too dark.

Q.—That is no cause for alarm as to condition in that chicken.

A.—It depends upon other conditions in the chicken. You have to prepare something to put in the chicken to take the place of the bones, and then it is prepared with aspic jelly and turned out in the square shape, and carve by cutting in slices, and it is astonishing the number of people you can serve with a chicken prepared in this way. If you want to try this dish, select a chicken that has not been frozen and that has an unbroken skin.

This is the mixture that is used in the Lillian Massey School in Toronto, which is now part of the Toronto University:

1½ pounds of chopped veal or you may use the flesh of another chicken or a young turkey. Sometimes in the old country, they use the tender loin of pork. It is well to use white meat. Rabbit is sometimes used. 1½ cups of white bread crumbs; 1½ teaspoonful salt; ¼ teaspoonsful pepper; ½ teaspoonful sweet herbs. (We use 2 tablespoonsful); ½ teaspoonful lemon juice; 3 tablespoonsful butter; 2 whole raw eggs; ½ tablespoonful chopped parsley.

Mix in order given and use stock or cream to moisten; that will be sufficient for three and a half pounds of chicken.

Q.—Would it be cooked meat or raw?

A.—Raw, it should on no account be meat that was cooked before. Place it within the body of the bird and with a teaspoon press it right in the cavities from which you have taken the bones, and fill up the whole of the body cavity, and then with a needle and cotton sew up the bird. Shape it as well as you can and roll it in muslin and wet it and allow twenty minutes to the pound for cooking and 20 minutes over. You can steam or cook it in water or stock. In the meantime you have the bones from the carcass with the giblets and you should allow them to cook in a quart of water until you have it reduced to half the quantity and then clarify that with the white of an egg and add French Leaf gelatine, ¾ of an ounce per pint liquid. Decorate a cake tin or a bread tin in the bottom in any way you fancy with hard boiled egg cut in slices, or you can use beets or lettuce and tomatoes and then pour in half inch or so of your jelly and let it set. Then lay your chicken on the top of that and fill up with the remainder of your jelly and set it aside to cool. When you turn it out you certainly have an extremely pretty looking dish which your friends will not think you make at home.

THE CHAIRMAN: I am sure we all have enjoyed immensely Miss Yates' lecture, and I know when we go home and try these things, we will want to come back the second time and see how we made so many mistakes.

Q.—What would be the proper charge for trussing?

A.—I think it is worth 5 cents for the trussing alone.

PROF. C. K. GRAHAM: We weigh the bird before trussing it, and we charge 5 cents a pound extra for trussing a bird. One that is bled and sold in the usual way at 15 cents a pound is the same as selling a bird drawn at 20 cents a pound. Suppose a bird that was four pounds undrawn is worth 60 cents, it will weigh three pounds when drawn and should sell for 20 cents a pound to bring 60 cents. A bird loses 12½ per cent. of the live weight by bleeding and plucking.

ADDRESS.

BY G. C. CREELMAN, B.S.A., M.S., PRESIDENT O.A.C., GUELPH.

Again it is my privilege, and I esteem it such, to welcome back to the Ontario Agricultural College men and women who are interested particularly in the subject of poultry and poultry culture. We are hearing a great deal about it in Ontario, and they are asking us for poultry experts for other provisions of the Dominion. The States to the south have for so long been leaders in many ways in this poultry business, but we are rapidly coming to the front. I feel that it would be quite out of place to attempt to discuss the subject with you, or take up your time in giving statistics of the poultry business on an occasion of this kind. I simply want to make you feel quite at home on the first evening of your stay with us. I want you to feel so much at home that you will not confine your whole time or observation to the poultry department, although I am sure that when we have men so interested in matters regarding poultry as Mr. Graham, you will find it pretty hard to get away for him, and I have no doubt you hardly find time for meals. I would be very glad if you would feel free to come into any of the other buildings and inspect them and learn as much as you can of what we are doing at this Institution.

Agriculture has come to occupy a place second to none in this country, and because of what has been done in agriculture the less than eight million people of this Dominion of Canada have gone to the expense and trouble of building three transcontinental roads, east and west. The country to the south of us contained forty million people before they thought they could afford to build a transcontinental road, so you see that although three transcontinental roads may not at present be able to live in this country with the population we have, yet, we believe it is an agricultural country, and that it will make rapid growth, and those who come to us from foreign shores will find comfortable homes here and will develop the country in the west. Then these continental roads will have all they can do in the days to come, and this Canada of ours will be a great country.

You will ask me "What are you doing, and what is your institution doing, and what are all these big buildings for and why are you spending $1,000,000 in buildings to educate the people of this province and of this Dominion to a proper understanding and better knowledge of this business which you say is the greatest business and which you believe is going to develop this Dominion of Canada and make it grow into a country as big and as great as the country to the south of us?" I want to tell you one or two things in connection with the work here so that you may have an intelligent idea of why the Government of the Province have started this institution and have so liberally supported it. Because of some of the work that has been done here, we find that the college has, to some extent, gotten a name abroad, and it might be interesting to you if I were just to read the headings of the correspondence which I find upon my desk after being absent from my office six hours. I went to Toronto this morning, and on my return I found that my stenographer had placed upon my desk these letters which will give you some idea of the scope of the work we are doing. The first one is from a family in Edinburgh, Scotland, asking me to kindly send a prospectus of the Guelph Agricultural College, as they have a son who is thinking of coming out to this institution. The next one is Newark, New Jersey; Glasgow, Scotland; Sarnia, Alberta, Nova Scotia Agricultural College at Truro; Dudley, England; Homestead, North-West England; one from Jerusalem, in Asia; and one from Toronto. That sort of thing gives us not only a broader scope for our work, but we know that the people are looking to us to give their boys and girls such instructions in agricultural work that they can help other countries to do better things in agriculture.

I will leave aside the work we are doing for the boy who is with us; The boy who comes to us from the farm has a practical knowledge of things. I see many of them sitting before me. They are not only practical men, but men who did things before they left home. We have men attending the College who can hardly be spared at home, and who could not come here in the fall until after the school opened; men who come here to get a knowledge of the why and wherefore of the things on the farm: Why do this and that, and the results you get by doing such things, and how to save a certain amount of time. I am going to say a few things about what we are doing for the farmers themselves—what we are doing to help them on their own farms. If we reached all the boys who were eligible to come to us, we would yet have left out a number of young men who cannot come and the older brothers and the fathers and mothers who want to get away from a lot of things they have been doing by rule of thumb, and who want to know why Providence has sent them weed pests and poultry diseases and fungus growths on fruit and insect pests on their crops.

I have before me the names of our Faculty for 1908-09. The first name I see on the list is the Professor of Dairying. What has he been able to do for the farmers of the Province? I heard him say at a meeting three years ago, that it was a great shame that there was such a difference between the average and the possible production of the cow; the average cow gave 3,000 pounds. And in order to back up his judgment he went and bought a cow, and he produced from that cow in one year 20,778 pounds of milk, and that is what he meant when he said that the difference between the possible and the average was very great. Apply that to your own business, the difference betwen the average farmer that has poultry and the best farmer; the one man is making money and the other does not know whether he is making anything or not.

The next one is the Professor of Field Husbandry. We had a little fight between the farmer and the miller. The miller said, "We want Manitoba hard wheat that gives us the largest percentage of good flour," and Professor Zavitz said, "We cannot grow that in Ontario, but we have a variety which we call Dawson Golden Chaff and I advise our farmers to grow that." The miller said, "That is not good wheat for flour." Professor Zavitz said, "That is your look-out, and you are still paying as much for it as for the other." Then Mr. Zavitz said to himself "That is all right, but is not there some way by which we can produce as good wheat as the Turkey Red that the miller will like?" And so he crossed Dawson Golden Chaff with Turkey Red, and from that he picked the best seed and planted it again till now he has produced—he has not given it to the world and will not until he gets it established—but he tells me privately that he has got something promising that he believes will meet the wishes of both the miller and the farmer. And if he can perfect it and send it out, he will have handed his name down to posterity.

The next I see on the list is the Professor of Landscape Gardening. Professor Hutt is now prepared to go through the length and breadth of this Province with illustrations of our college greenhouses and grounds and help every rural school in the country to make better gardens and have plants, so that they can pick them up and look at the roots and see how they are growing. Teach the children something about agriculture when their time is not worth very much. Let them play at it. We believe that is good work.

The next is the Professor of Animal Husbandry, and no matter what we may do to grow better peas, oats, barley and rye, if our cattle are not right and our sheep are not right and our swine are not right, although we may raise great crops of these grains, we will not have the proper animals to feed the grain to. If we feed good grain to inferior cattle, we will not get good returns, and Professor Day is going throughout the length and breadth of this country lecturing on Animal Husbandry. He was at Carleton Place last week, at Lindsay the week before, and this morning he has gone up to Ayr. When he is not lecturing to the students here, he goes about the country and gets from thirty to three hundred farmers together, and brings into the ring cattle, sheep and swine, and talks about them. He will say, "What do you think of that fellow,—have you got one as good as he is?" And then they thresh out the different points, and by comparison they find out what they know, and very often what they don't know, and some farmers will go home and say, "I am not going to be satisfied with a poor kind; I am going to buy a flock of sheep or a herd of cattle and I am going to take a pride in them."

The Professor of Chemistry is next. What can he do for the farmers? He told me the other day he analyzed a sample of so called bran that was all oat hulls. They had taken out the oat-meal and sold it to the Scotchmen, and then they took the hulls and ground them up and sold them to the Irish to feed their cattle. From looking at it, I could not tell whether it was ground oats or hulls or bran. Professor Harcourt said, "This must not be. We have no business to be paying for these things, and a committee was appointed at the Experimental Union to go to Ottawa and point this out, and get a law that will protect the farmer. If the President of the Agricultural College says it looks good to him, how is the ordinary farmer to tell. The Professor of Chemistry says, "I will not take any chance. I will find out for myself;" and he has the appliances and he goes to work and analyses.

Professor Dean heard that they were using boracic acid in butter, and he said to Professor Harcourt, "Find out whether that is bad or not," and he got a lot of the College boys in the dining room, and he said "What do you say to our feeding you on boracic acid?" He tried it, and they found it had no ill effects, and he doubled the dose and then increased it to twenty times as much, before it injured them, or before they said they did not care for more butter, and the result was that he was able to say to the consumer that the amount of boracic acid used in the butter would not do any injury.

Professor McCready is down as Professor of Botany or Nature Study. What is that? We have been trying to find out what is nature study. We find that the country boys and country girls are not learning anything about country things. The English school teachers came over here to get ideas of our schools and they said to us, "What are you doing for your farmer boys and girls?" We said to them, "Come and look at our town and city schools. Are they not nice buildings, nicely ventilated and have we not nice blackboards in them, and well dressed children?" And they said, "We agree with that, but we hear you are an agricultural people, and we see your signs up in old London, and see displayed samples of oats and peas and other grains, and we see you have an immigration office in Whitehall, and advertise 160 acres free. What are you doing for the agricultural population?" And we were obliged to say, "We are not doing very much. The boy in the country is taking Canadian History and English History and arithmetic and Geography." Mr. Mosley said to me: "Are these boys going on to the High School like the other boys or back to the farm? Are they getting anything that will help them on the farm? Could not you do something for these boys that will make them more useful citizens at home?" And we commenced thinking about these things, and we have evolved a system that we think will help.

We have arranged with the Educational Department to send us anywhere from one hundred to three hundred teachers from the Normal Schools, who are going to teach in the country. They are coming to us this Easter and during three months we are going to have Professor Day, Professor Harcourt and Professor Hutt teach them, and they are coming over to the poultry department for a few days to learn what they can about these different things.

We want to let them know what poultry is, and what incubators are, so that they can give the children an opportunity to study things. Nature study is pointing out things of a rural nature. Professor McCready is going to give them studies to take home so that they can get the boys and girls to think agriculturally, in order that when they get to be farmers and farmers' wives they will know something about the things they are tramping over all the time. The names of the common birds and common insects and weeds, so that they will not go blindly out among them and not think, because their attention has not been called to them.

Then we have Mr. W. H. Day, Lecturer in Physics. A farmer said to me the other day, "What do they do with Physics in Agriculture?" The department of physics is one of the most important we have here. A man said to me the other day, "I live in Victoria County, and the water lay on ten acres of my land until June, and I could grow nothing on it but hay and oats." He notified our Professor of Physics, and he went down and gave him a plan so that he could underdrain it at an expense of about $14.50 an acre, and it is now the earliest field on the farm. There are hundreds of thousands of acres of land in this Province of Ontario that needs draining. The tile factories of this Province are now working overtime to get tile ready for the farmers who want to underdrain their land.

Then we have Mr. E. J. Zavitz, Professor of Forestry. What do we care about Forestry? We are a forest country. But some men come along like Dr. Clarke or Dr. Pinchot of Washington, and they say "Stop!" What is the matter? "Why," they say, "we have not got fifty years' supply of timber in the world. Germany is now importing wood. There are only two countries in the world that have more wood than they can use and that is Canada and the Scandinavian Peninsula, Norway and Sweden, and they are giving out."

I went down on the train this morning with the manager of the Massey-Harris Works at Toronto, and he said, "We have brought in fifty million feet of lumber from the United States since the first of January. We are buying nearly all of it in Arkansas and Ohio. We cannot get it in Canada, our timber is about exhausted." We are starting to grow here, little trees from seed. We have waste land all through this Provinces from which the timber should never have been cut, rocky places that are a disfigurement to the landscape. Suppose it does take fifty years, we are apt to think that is too far ahead. If it takes fifty or seventy-five years, what is the difference? It is going to give us a revenue and the Government has taken it up.

There are waste places north of Cobourg and in Norfolk County and in Simcoe and in Lambton, a strip nearly fifty miles long. Thousands of acres in Old Ontario could be replanted with first class pine, and the time will come when we will get this back. What have we got to say to posterity for what we have done in the year 1908? Millions of dollars worth of pine was burned up simply for the want of a little policing on the outside.

I might go on and speak of the work of Mr. J. W. Crow. If you tell a manufacturer that by doing a little extra work he would double his money, he would do it at once, but farmers don't always look at it that way, and very often they neglect to spray their orchards and lose more than half their crop. We want to tell the farmers how by doing little things they can make of this country a big and better and stronger and healthier and more wholesome country to live in. (Applause).

ILLUSTRATED ADDRESS.

By T. F. McGrew, Scranton, Pa.

I am sure you are all delighted with what your President said about what you are doing up here in the Province of Ontario, and I was delighted when he said what he did about old Scotland, because nearly two hundred years ago my people left Scotland and went to the south part of Pennsylvania. Two hundred years is not a long time, because the hills of Pennsylvania have been stripped in that time so bare that even the grass has forgotten to grow, and if you can send somebody down there from this country who will make one blade of grass grow where there used to be an hundred they will give you a gold medal.

Men and women have been foolish. Perhaps I have been foolish in spending so many hours of my life in attempting to trace out the different origins of poultry. I have traced a different origin from that scientific man, Mr. Darwin. When in Boston a couple of weeks ago, I was asked to make a few remarks. Old Uncle Henry Hales, an Englishman, said he had heard me talk before, and he did not believe a word I said, because Darwin knew more about it than I did; but when I asked the old gentleman if he believed everything Darwin said, he replied, "I am no monkey." Ben Butler said he had been called a great many things, but he had never been called a fool. I have been told by some people that I was wrong in some of my ideas as to the origin of poultry, but no one has ever told me yet that I was a fool in what I said; and I am going to try to present to you to-night my idea of the origin of poultry, and my reasons for saying what I do. Mr. Darwin and other people of his character tell us that all pigeons came from the Blue Rock. He also tells us that all poultry came from the Gallus Bankiva, or what we call Black Red Jungle fowl of India. Mr. Darwin had settled that theory beyond peradventure, when another gentleman discovered two more jungle fowl which he thought might have had a hand in the game, and then another man discovered in the Island of Ceylon a little jungle fowl that he described like this, "In form they are like a minature Shanghai or what you call in England the Cochin fowl." Now, we have these three, the Gallus Bankiva, Sombretta, and the Ceylon Jungle fowl. I have been fortunate enough to have seen and handled plenty of the Bankiva, and I have four living specimen of the Sombretta or Jungle fowl. From the jungles of India come a great many of the Pheasants; the Pea fowl are plentiful there. If all fowl came from the Gallus Bankiva where do the woolley hens come from, and where do the silky coat come from? It is very difficult to imagine, indeed, where these birds come from.

Mr. McGrew then gave a very interesting illustrated address on the different breeds of fowl and pigeons, describing each slide. His remarks were listened to with rapt attention.

DISEASES OF POULTRY WITH SPECIAL REFERENCE TO LIVER DISEASE AND WHAT IS COMMONLY CALLED "WHITE DIARRHŒA."

BY GEO. BYRON MORSE, M.D., Ph.D., V.S.

[Dr. Morse is in charge of investigation of poultry diseases and diseases of cold-blooded animals, Pathological Division, U. S. Bureau of Animal Industry, Washington, D.C.]

I trust that you have brought along your salt cellars, for you will need a pinch or two of that excellent corrective. When our genial chairman tells you, "This is our opportunity to be instructed in these matters which we know too little about, and Doctor Morse is well able to give us the information we want," you should ask him if he has taken that information himself. You know that the chairman is reputed to be my strongest opponent upon this subject, and I suggest that, unless he shows evidence of conversion this morning, you call on him, when I have finished, to present his side.

It must be recognized that there is opposition, deliberate or unintentional, to the views I represent. Now, there are two ways of dealing with conditions of this kind. One is the diplomatic way; I am not able to adopt that method, I am a little afraid of it. The other is the method of the man who wants to fight a duel, and who says to you at once, "Prepare to defend yourself," and then draws. I am here not merely to urge you to stop a certain line of theorizing, but to charge any of you who are giving all your time and thought to the hypothesis of dietetic origin of liver diseases, with being obstructionists at the present moment in connection with our study of the diseases of chickens. I am sure that is a fair and square way of throwing down the gauntlet. I do not know of any thing that is more severe than that, and I would not dare say it if we did not have as chairman a gentleman whom we all know and whom we delight to recognize as always worthy to give battle on this subject. I speak thus strongly because poultrymen have been working on the theory of overfeeding and improper feeding in its various forms for years. You may trace back as far as you please in any of the poultry journals, and you will find constant reference to the idea that these various diseases of the liver are due to overfeeding or feeding the wrong material. Accompanying this theorizing has been apparently an increase in disease. Over against that we must place the work of physicians and the work of other scientists who have been investigating diseases and finding living organisms or germs as the causative agents of disease, with the result that in the measure that these microbian causes have been recognized diseases has been more or less controlled. But so long as there is this determination on the part of poultrymen to think that almost all the ailments of chickens are due to the same disturbance and to the same organ that most of the patent medicine advertisements charge with the ailments of man, namely, the liver, just so long will there be a refusal to accept scientific facts, and so a failure to secure benefit from these facts. I do not mean that you may not, in some cases, come back from the germ theory to that hypothesis, but I do say that if well meaning men of reputable standing in the scientific world are finding germs as causative agents in disease, and from time to time locating them in these very organs that you claim are affected, and are finding out that they cause disease in the liver and in other parts of the fowl's body as well as in the organs of other animals, and you refuse to recognize these facts, just so long are you helping to obstruct the present movement of science in the study of poultry diseases. The best way is to get in line, accept and acknowledge the possibility of germs, thus giving the scientist a chance, and if he does not make good, lay his theory aside and take up again the old theory. There is one sure way of doing this; that is to have every agricultural college and every experimental station supplied with a poultry pathologist, who shall devote full time to the study of the organisms of disease which may, by the remotest possibility, affect poultry, and bring all data thus secured to bear upon the elucidation of poultry diseases. You say you cannot get the men or women? Yes, I think you can, because when once the germ theory is fully accepted and you start in to locate these germs in the animal or vegetal kingdom, you will find that there is a rather limited number, and it will be possible for your graduates who have gone extensively into this question, to prepare themselves, in a few months, to handle this question with considerable intelligence.

We may divide the diseases of the liver into two classes: infectious and non-infectious. The non-infectious diseases *are* important, nevertheless, I wish to put most of my time, to-day, on the infectious diseases.

NON-INFECTIOUS DISEASES.

Any disease which affects the liver must disturb the whole organism. Ordinarily speaking we attribute to the liver three functions, the production of bile, the production of glycogen, and the production of urea. In addition to these functions it also manufactures a various number of enzymes which have for their purpose the dissolution, the transformation, the precipitation and even the destruction of toxins that are brought by the blood to the liver, especially from the intestines.

Q.—What do you mean by toxins?

A.—As just used by me the word would signify chemical poisons which result from life changes in the organism, what I might call the products of tissue change in the living body. That is not the usual definition of the books, but I think it will cover what we are after in this study. Quite frequently the books give the definition in such manner as to connect toxins altogether with bacteria. We ourselves produce toxins in the various changes going on in the body in connection with the assimilation of food and the destruction of tissue. Bacterial life in its development produces toxins, when attacking an organism the bacteria discharge these toxins which have the same effect as though a poison had been introduced into the system.

Now, you see the importance of knowing something of the non-infectious diseases of the liver. Because if through bad feeding, through cold, or any wrong condition of living, the liver be disturbed in its functions, at once you have the whole assimilative work of the organism disturbed, and you have the system undermined in its power to resist the toxins that are generated by the bird itself, to say nothing of those that are sure to be produced by disease organisms that may attack the bird. We must remember therefore that there are diseases of the liver produced by bad feeding.

Q.—What would you call bad feeding?

A.—Over feeding; feeding wrong articles of food; feeding chickens that are in close confinement material that will furnish proteid matter in such a way that the bird will develop gout. Perhaps you had not thought of birds suffering from that disorder, but I hope to show you pictures to-morrow night of that very disease.

Q.—What food would you recommend?

A.—That will have to be left to the men and women who are experienced in such work.

Q.—That liver we had yesterday in Miss Yates' demonstration was the result of too high feeding?

A.—Yes, there occurred a breaking down of tissue, the normal substance of the liver was changed into fat. Now, then, that liver could not possibly cause a germ disease. Let me call your attention to something that only too frequently occurs. You call in a physician. He says, "I must take your temperature." He puts a thermometer in your mouth. Temperature, 102. He calls again, finds the temperature is 103 and remarks, "Getting close to the typhoid temperature." He orders a little calomel and tells you to keep quiet for a day or so. The fever subsides. The disturbance in the liver and in the whole organism due to a certain sluggishness of the liver is overcome. When the physician returns he finds your temperature normal, and to your statement that you now feel quite well, he responds, "If you had not called me in just when you did you would have had typhoid fever." Now, that is all bosh. It is the most absolute kind of rubbish for a man to talk that way. You cannot have the typhoid disease without bacteria of the typhoid class.

You may have a fatty liver, or a poor, old, dilated, fatty heart, and you may have an enlarged spleen, and you may be like Mephibosheth of old, "lame on both feet," and all these things combined could not cause a single germ disease, a single infectious disease.

The CHAIRMAN: If you have this fatty degeneration of an organ does that organ become thereby more easily exposed to germ disease?

A.—Mr. Chairman, you pulled my thunder last August at Niagara, and now you have drawn my whole charge. We may have much hope of our chairman coming round to the proper view. (Laughter.) In view of the fact that he knows these things I can only say to him in the words of a book, the reputation of which was established hundreds of years ago, "If ye know these things, happy are ye if ye do them."

Our chairman has anticipated just the point to which I was coming. If a person is in the condition I have described he is in a most splendid condition to become a victim of any pathogenic germ that is travelling about. It is for this reason you must maintain your vitality at the highest point. This is the very thing I tried to impress upon you at Niagara. These various conditions do not produce germ disease. You must have the organisms in order to have the infection. As I do not care to spend much time to-day on the non-infectious diseases, the point that we have just reached offers an excellent opportunity to turn to the discussion of

INFECTIOUS DISEASES OF THE LIVER.

The importance of infectious diseases is seen in the fact that although a non-infectious disease may terminate in death, still it begins and ends with one chicken, while on the other hand, an infectious disease, beginning as it may—and usually does—with one chicken, is very apt to end with killing one or two hundred birds or possibly the whole flock.

Taking up the infectious diseases I desire this morning to call your attention to a group of diseases represented by such specimens as you see here on the table. These specimens show marked changes in the liver, they are samples of diseases that present necrotic change. Pick up any of these jars, and you would say, "Here are areas of necrosis," that is, areas of death in living tissue. Here, for instance, is a liver a portion of which appears healthy; on the other hand, other portions of it have suffered degeneration, even death, and where you see these little round nodules or cheesy spots, there you recognize what we call foci of necrosis or necrotic areas. There has been disease here that has caused complete death of limited, circumscribed portions of the living tissue.

I really think that apart from medicine, everybody ought to be familiar with the meaning of the word "necrosis." It means local death in living tissue, death of a portion of a living body. This word has an important position in one passage in the New Testament. When Paul used the expression, (2 Corinthians, IV. 10) "Always bearing about in the body the dying of the Lord Jesus," he used this word "Necrosis," "Always bearing about in the body the 'necrosis' of the Lord Jesus." Here was a man, a living man, who was constantly saying "No" to certain tendencies of the flesh, these negations being caused by his adherence to the word of Christ and to the life of Christ. It was death, or, using an old word, mortification within the living body. So you see the word is one that we ought to understand apart from matters of medical science.

I shall now place on the blackboard a list of diseases characterized by the presence of necrotic areas in the liver. This list is made up from cases that have been investigated in the laboratory at Washington in connection with the post mortem examination of chickens sent in for that purpose. Over against the name of the disease I place the name of the causative agent when that is a micro-organism. I am sorry to burden you with these long names, and do not blame the laity for lumping these affections under the one general title of "liver disease." Unfortunately, for the use of this general term, the treatment of these diseases varies according to the cause, hence the importance wherever possible, of securing a careful diagnosis.

TUBERCULOSIS	*Bacillus tuberculosis*
COCCIDIOSIS	*Coccidium tenellum.*
CERCOMONADOSIS	*Monocercomonas gallinarum.*
ASPERGILLOSIS	*Aspergillus fumigatus.*
PYEMIA	*Staphylococcus pyogenes aureus.*

INFECTION DOUBTFUL.

LEUKEMIA
SARCOMATOSIS
CARCINOMATOSIS

NON-INFECTIOUS.

GOUT (visceral).

TUBERCULOSIS.

All of these specimens are examples of tuberculois, in which disease we frequently have these necrotic areas developed to great size. Notice the prominence of these nodules, how salient they are, protruding above the surface of the liver. Here is a cut nodule, notice the peculiar cheesy character of the cut surface. Generally the liver is greatly enlarged. Sometimes on opening the fowl's abdomen the liver appears to be the only thing there. Here are some specimens in which the spleen is enlarged and studded with tubercles. Such a case as this, which I understand came from a goose, showing this huge, chessy mass in the lungs is in my experience quite rare in poultry. The liver, spleen, and intestines are most frequently involved. Here is a fine specimen presenting tubercles on the intestines. These intestinal lesions are important as showing the source of infection and the manner in which the disease is spread upon the farm when once introduced. Many of these nodules open on the inside of the intestine and so contaminate the intestinal contents, and thus the droppings become infectious. I have been able to transmit the disease by placing healthy birds in cages with diseased birds.

Q.—May these necrotic areas be formed by dietetic causes or are they always the result of a germ?

A.—If you mean these necrotic areas, no; they can be caused only by the bacillus tuberculosis. If you mean necrotic areas similar to these, that is, whitish or yellowish, cheesy nodules, no; they would require either the action of micro-organisms or some malignant cause such as we have to assume in leukemia, sarcomatosis, or carcinomatosis. But if you mean to ask if dietetic disturbances can cause necrotic areas in the liver, I answer, "possibly, yes."

We know that bacterial toxins circulating in the blood often produce small areas of necrosis in the liver, so that the liver will appear studded with pinhead, yellowish spots. We must for this reason concede that it may be possible to have such areas produced by toxins generated as the result of what we call in medicine, faulty metabolism, what might be termed depraved nutrition. Let me at this point dispose of the last named disease in the list—visceral gout. We know that gout is due to faulty metabolism; sometimes it manifests itself in the joints; at other times it attacks the internal organs or viscera. To-morrow night I hope to show you pictures of visceral gout in a chicken, also views of minute collections of crystals of biurate of soda that having been deposited from the blood in different portions of the liver produced these small necroses.

A diagnosis of tuberculosis should never be accepted without a microscopic demonstration of the presence of the bacillus of tuberculosis in the nodules. The ordinary data which you send to the editor of a poultry paper, going light, pale combs, spotted liver, are not sufficient for a true diagnosis.

Q.—Dr. Brown, of England, says that when a chicken dies of roup it also has tuberculosis.

Dr. MORSE: I could not go with that, especially if by that statement it is meant that roup and tuberculosis are always associated in the same bird or that the two diseases own the same cause. While denying the *necessary* association of the two affections, I am perfectly ready to admit the *accidental* association of two such infections or even more in the same bird. A few years ago I found a triple infection in a Snowy Owl. One lung was quite destroyed by *aspergillosis*, a nodular disease, often resembling tuberculosis, and, as we shall see later on, produced bv a mold. Now, in smears made from the cheesy material in those nodules I found a few tubercle bacilli, but that did not prove to me that tuberculosis was the cause of death in that case. I found a few little hard glands, somewhat enlarged, in the region of the intestines. This material I inoculated into guinea pigs with the result that they became tuberculous. On further examination of the owl I found the other lung congested, the liver greatly congested and the spleen enlarged and dark. In the lung that was not infected with aspergillosis I found nothing to suggest tuberculosis, but this did not warrant me in assuming that aspergillosis and tuberculosis are to be sought in association as in the infected lung. As I examined further I noticed small areas containing yellowish gelatinous fluid and feeling sure I knew what that meant I sowed some of the heart blood, a bit of liver and a bit of spleen on to culture media and secured pure cultures of *Bacillus proteus*, that particular variety that has been recognized as the cause of infectious jaundice in man. This was indeed an association of diseases.

Q.—How are we going to avoid this disease?

A.—When purchasing new chickens fight shy of stock in which you find birds with anemic or yellowish combs, even if the owner does tell you that the feed hasn't been just right. If the disease should get into your flock, kill every fowl that shows signs of it. However, if the entire flock should be infected, try the Bang method, the method of eradication practised on cattle in Denmark.

Q.—How do you know this disease is there?

A.—Your suspicions should be *aroused* by finding birds which present an anemic condition of the comb and about the eyes. If such a fowl dies, carefully open the body and if you note yellowish nodules on the liver and spleen and along the intestines your suspicions should be *strengthened*. The only way to *confirm* them is to send this material to the nearest agricultural college, experiment station or pathological laboratory and have it examined by a competent microscopist.

Q.—Haven't they, by that time, got it bad enough to spread it to other chickens?

A.—Very likely; by means of the infective droppings contaminating the ground. However, you can eradicate the disease without destroying all the chickens at once. Keep the old stock on the old ground. Prepare new ground, upon which to raise the young chickens by top-dressing with lime, deep plowing and exposing the soil for some weeks to the sunlight. Now, take your eggs from this infected stock, wipe them in 95 per cent. alcohol or 4 per cent. solution of some good coal tar disinfectant, hatch in incubators, and raise the chicks at a distance from the old stock. When the new lot of chickens have come to laying age you may kill the old stock and treat the ground by the method just outlined.

Q.—Suppose I take two hens, one has tuberculosis, and the other has not, and I put the eggs in an incubator and raise chicks, won't they have tuberculosis?

A.—No.

Q.—Is it possible for the bacillus to be in the egg?

A.—For all practical purposes, no. Tuberculosis is considered by scientists generally as practically not an hereditary disease. That is to say, the number of cases of congenital infection is so small as to be really a negligible element for consideration in the battle against the disease. As to the actual possibility of the tubercle bacillus being in the egg, I must answer, "yes." The careful investigations of Koch and Rabinowitsch, published in 1907, prove not only the existence of tubercular disease of the ovary in birds, but also the possibility of the transfer of the bacillus to the egg. As early as 1889, Maffucci, an Italian experimenter, inoculated eggs with tubercle bacilli, incubated them and proved that while the presence of the bacilli did not hinder the development of the embryo, yet later, a few weeks after hatching, the bacilli began their destructive work in the body of the chick. In a later series of experiments, carried on between 1898 and 1903, the same worker demonstrated, among other facts that small quantities of tubercle bacilli were destroyed by the tissues of the embryo, although these same quantities produced tuberculosis when fed to or inoculated into adult chickens or chicks hatched from healthy eggs. Several other investigators have secured results which lead to the conclusion that in birds as well as in cattle and swine, the possibility of infection of the embryo is too small to be taken into account in the eradication of tuberculosis.

Q.—Take a hen of low vitality, do you mean to say that she is going to produce healthy offspring?

A.—That is a question that must be answered by experience rather than by theorizing. If a brother or sister of mine died from tubercular disease, I should thank the physician for letting me know it. Why? Because I would recognize that I came of stock that appeared to be more easily susceptible to the microbe of tuberculosis, and I would take the precautionary measures requisite in such a case. I never like to brag about my health or my immunity to disease, yet, having looked a long way back into my family history, I sometimes say, "given ordinary conditions, I have no fear of contracting tuberculosis." Of course, I associate with family history the existence at present of almost superabounding health and, therefore, a marked power of resistance. But if I had among my ancestry individuals who had succumbed to this disease, I would recognize that I belonged to a strain that is susceptible, and I would live out of doors all I could. I would run a chicken farm, avoid working to the point of fatigue, eat all I could, and sleep out of doors eleven months of the year. What I have just said, you see, is in strict accord with the theory of weakened offspring from a breeding stock of low vitality. Nevertheless, on the other hand, experience compels us to go with such prominent authority as Professor Bang, of Demark who says that a farmer can eradicate tuberculosis from his herd without killing the infected stock. The calves are taken, at birth, away from their tuberculous mothers, and fed on pasteurized milk. This precludes all possibility of infection by association. Since there is practically no chance of the disease being inherited, if the calves are protected from contagion, he finally obtains a herd free from tuberculosis That method has proven satisfactory in the development of herds, and there has been thus far no evidence of weakened vitality.

Since we are all looking forward to a discussion of the subject of White Diarrhœa as the closing part of my topic, I will pass for the present the subject of coccidiosis which stands second on this list.

Cercomondosis.

The next disease of the liver that is characterized by necrotic areas I have placed third on the list and called it *Cercomonadosis*. This disease is caused by a micro-organism called *Monocercomonas gallinarum*, which, like the coccidium, belongs to the lowest group of the animal kingdom, the Protozoa. The cercomonad is a flagellate organism, that is, it is possessed of from one to four very long flagella or whips by means of which it thrashes about in the fluids. This liver has such small, scattered, almost depressed necrotic spots that I would venture to think it was a case of cercomonad disease. In Washington I have had cases similar to this, and when I have placed a minute bit of the cheesy material in a drop of normal salt solution and examined it under the microscope I have found numerous, small, oval, round or irregularly shaped bodies about fourteen twenty-five thousandths of an inch in length, sometimes in diameter, having at its blunt end a slender prolongation about the length of the body itself, and at its pointed end from two to four flagella or whips united at their base. Sometimes we find but one flagellum, but this is probably because the others are broken off.

Prof. GRAHAM: Does Cercomonadosis ever attack little chickens?

A.—Yes. I frequently find it in fatal diarrhœas of chicks and even adult fowls. Since we know that the white color in so-called white diarrhœa is due to the presence of excretory matter from the kidneys you will not be surprised when I tell you that the diarrhœa caused in the chick by the cercomonad is sometimes white. However, speaking off-hand, I should say that the majority of cases I have seen have been characterized by dark to black fecal discharges. This black coloration, as you are of course aware, is due to the admixture of blood due to the character of inflammation produced in the intestines. In these cases I have never found the enlarged and plugged ceca found in coccidiosis. This cercomonad, possibly with a slight change in its second name, is the cause of canker in squabs.

Prof. GRAHAM: Carbolic acid would put that out of business?

A.—Yes, I think it might if taken early enough. The difficulty with squabs is that we are not apt to notice the disease until there is quite a mass of necrotic material in the throat and the tissues much distended with gas. Scrape off all canker in sight and apply, with a swab, 2½ per cent carbolic acid in glycerine. For diarrhœa caused by this organism inject into the vent 1 per cent. aqueous solution of carbolic acid. I find the same liver trouble produced by the cercomonad in adult pigeons as in fowls. I have never found the necrotic livers in chicks or squabs.

While on this subject of cercomonad disease I want to tell you that I believe that the majority of cases of roup may be set down as cases of cercomonadosis. I have quite frequently found it in the necrotic material of the mouth and of the eye. There are those who tell us that roup is due to a bacillus and that the cercomonad is not pathogenic (that is, disease-producing) and only happens to be associated with the disease. Now, in the first place, those who claim a bacillary origin for roup should produce the bacillus and several investigators claim to have done so, but the trouble that I find with their work is that nearly every man produces a different bacillus. In the second place, the *Cercomonas gallinarum* is pathogenic; as I have told you, I have found it in liver necroses where there was absolutely nothing else to cause the trouble. If this organism causes necrotic disease in the liver, why deny it the power of doing the same thing in the mouths and throats of chickens and squabs. Here is an important point in the recognition of this disease agent. You have no difficulty in recognizing them when active. But they appear to be chilled very quickly by cold, and killed too, for that matter. Now, as they pass into the quiescent stage of either chilling or death, they draw in the tail and their flagella drop off; they also assume a perfectly spherical shape. In this condition, unless one is very familiar with them he may call them white blood corpuscles, or if not up on the subject in general, might think they were cells of the tumor called sarcoma. It may in its encysted form even be mistaken for certain stages of the coccidium.

ASPERGILLOSIS.

Aspergillosis is another disease in which we find necrotic areas in the liver. This affection is caused by the presence in the tissues of a mold known as *Aspergillus fumigatus*. This mold has been known for years as the cause of what was long termed a pseudo-tuberculosis. It is a very frequent disease in birds, in which it causes especially a disease of the lungs and air-sacs simulating tuberculosis. The liver, as well as other organs, has to submit to the encroachments of this organism, in which case we find the liver studded with minute points of necrosis. I refer to aspergillar disease of the liver, not because it is important but to keep you in mind of the fact that there are numerous diseases of the liver that are not due to improper feeding or diminished vitality.

While speaking on this disease I wish to call your attention to the recognition last spring of aspergillar disease in very young chicks. On page 32 of the Report of the Chief of the Bureau of Animal Industry, of the U. S. Department of Agriculture, is a reference to the fact that it had become possible to differentiate between two forms of so-called white diarrhœa. After the publication of Circular 128, I saw some statements in poultry papers, and also received a few letters to the effect that Dr. Morse did not know what he was talking about when describing white diarrhœa. I had described, as the particular alteration in white diarrhœa, the distended, cheesy ceca. But these people said that the majority of the cases were associated with nodules in the lungs. Such cases have been termed "lungers" by many poultrymen. So I took up the subject of "lungers," and 95 per cent. of all the cases that came to hand last spring proved to be cases of aspergillosis; that is, I could not find a sign of a coccidium in these nodules, neither could I find a trace of baccillus tuberculosis. I did find a mass of felt-like material, the mycelium of a mold. I transferred portions of these nodules to potato and in almost every instance was able to grow the *Aspergillus fumigatus*. From some of my investigations I am inclined to think that there may possibly be other mold forms incriminated sometimes, for instance, a penicillium form.

One is naturally anxious to seek out the source of a disease like this. And the question presents itself, "Shall we have to go back to the egg itself?" As long ago as 1740, a French physician, Ferchault, in his work on "The art of hatching and rearing at all seasons domestic birds of all species," reported the finding of molds in incubator eggs, the shells of which appeared perfectly intact. Since then several other investigators have found molds, notably this mold that is engaging our attention, in the interior of egg shells. I recall, especially at the present moment, that Lucet, a well known French investigator, found this Aspergillus in eggs that had failed to hatch, the embryo dying during incubation. If a mold has been introduced into an egg prior to incubation, the conditions of incubation furnish the necessary requirements for the development of the mold. We might thus have the mold developing along with the embryo. This might, therefore, be the cause of chicks dead in the shell; it might also be the reason for "lungers" developing at such an early age.

Q.—Would that come through unclean nest boxes?

A.—Newly hatched chicks might be infected by breathing the spores of molds in clover chaff or some such material placed in the nest. The infection of the eggs, however, could not come through unclean nest boxes. We find intestinal mold diseases quite frequently in fowls. The spores of such molds might be driven from the cloaca up into the egg tube and located in the egg prior to the application of the shell. It is known that molds growing inside the egg do not develop fruit heads owing, probably, to an insufficiency of oxygen.

Q.—We have found in a freely ventilated incubator, where there is an exceptional amount of oxygen, that lungers are more apt to develop. Would carrying extra oxygen cause it to grow better than it would under natural incubation?

A.—I do not know how that would be; it might. The Aspergillus is known to be essentially an aerobic organism, that is, one that grows best in the presence of oxygen.

Last spring I received from one man several lots of lungers. He first wrote me about White Diarrhœa. I told him to secure new incubators and new brooders. He did so, and then sent me these lungers. I met him at Niagara last summer and he told me that he had not had a case of lungers since he began using a fireless brooder. Now, I am not here to advocate fireless brooders, but you can see that anything that means the introduction of heat increases the likelihood of molds.

Q.—Will molds develop in a very dry temperature?

A.—Excessive dryness of the atmosphere would be a hindrance, but you must remember that in a brooder where you are raising chicks you are constantly receiving a fresh supply of moisture from the air; dry the atmosphere sufficient to prevent the growth of molds and you would kill your chicks. An interesting point in connection with the case just mentioned is that whereas a new incubator and a new brooder, unsterilized might lessen the cases of coccidiosis, to safeguard against aspergillosis or brooder pneumonia, you would still have to disinfect even the new machines. In the latter case the spores are floating in the air, and the ladies will tell you that if you leave almost anything around the house it will become moldy. Laying aside the possibility of egg infection within the hen it would appear that the new brooder was infected with mold spores and thus the lungers were produced.

Q.—What section were they in?

A.—It was north of Washington.

Q.—If these chickens had been hen hatched, they would not have been lungers?

A.—The first cases of lungers that I ever saw were hen hatched and hen brooded.

Prof. Graham: I do not think we have ever had a lunger in a hen hatched chicken. We get a bird with a congested lung; we find that in the egg before it hatches. You can take that egg on the 20th day, and on the 21st day, you will find that congested lung in the chicken before it is hatched.

Dr. Morse: Will you send me some?

Prof. Graham: Write to B. S. Hosmer, of Massachusetts, and he will keep you stocked with them. A doctor in connection with Harvard Medical College, conducted this work for me up to about three years ago, and then he said that he had not time to go any further. You will very often find one of the air sacs of the chicken filled with matter. It is right back of the lung.

Dr. Morse: If you insert a sterilized needle into that and sow some of the material on a potato you will probably grow the mold, Aspergillus.

Q.—Why do we so frequently find incubator chicks with only one lung?

A.—I do not know. I was not aware of such an occurrence.

Q.—Would that mold sometimes adhere to some part of the grain?

A.—Yes; and its direct relation to the disease in pigeons was beautifully shown by one investigator who found the mycelium of the mold developing from a grain of corn that had passed into the bronchiole of the bird. In France there are pigeon feeders who feed thousands of young pigeons daily by taking into the mouth a mixture of grain and water which is then forced into the bird's mouth in a manner similar to that practiced by the old birds in feeding the squabs. These men frequently suffer from a pulmonary disorder, and instead of finding tubercle bacilli in the sputum physicians find only the mycelial threads of this mold.

Q.—When you are buying a sack of grain, if you put your nose into it you get a musty smell; will not that kind of grain produce disease?

A.—I should be afraid of it. Those who are feeding large numbers of chicks might easily institute an experiment. Feed some of the chicks sterilized grain and boiled water; others, sterilized grain and unboiled water; still others, in the usual manner. By this method the origin of the trouble might be apprehended.

Q.—The litter in the hen house should not be moldy?

A.—No, it should not.

Q.—What effect would carbon dioxide have on the development of molds?

A.—As a food, nothing; for only plants containing chlorophyll have the power of utilizing carbon dioxide; plants that do not contain chlorophyll are compelled to obtain their carbon from the carbohydrates. An atmosphere saturated with carbon dioxide inhibits or stops the growth of molds. A slight addition of CO_2 acts as a moderate stimulant, but mainly, if not only, by reason of its slightly acid character.

Mr. Nix: I never had a case of White Diarrhœa in a carbon dioxide incubator.

PYEMIA.

Pyemia may be defined as blood poisoning, characterized by the formation of abscesses in the internal organs. We have not time for a careful study of all these diseases. I mention this disease in the list because the presence of abscesses in lungs, liver, spleen, and along the intestinal walls may to the untrained eye appear identical with tuberculosis or some of the other affections mentioned. I hope to show you on the screen to-morrow evening such a case as this just described which originated from such a simple thing as "bumblefoot." The palmer abscess was the starting point for the abscessess in the liver and other viscera. Treat your cases of bumblefoot as serious ailments; they contain pus. An abscess, that is, a puddle of pus, should be evacuated as quickly as possible.

LEUKEMIA.

Leukemia is a disease characterized by a great increase in the blood in the number of white blood corpuscles and scattered accummulations of the same in certain internal organs, notably the liver, which may then become greatly enlarged and so studded with small, round collections of these cells as to give at first the impression of tuberculosis. Professor Moore has described an infectious leukemia of fowls dependent upon the presence of *Bacterium sanguinarium*. Poultry, however, appear to be affected with a leukemia of the same character as that which is seen in animals and man. It has not been much studied neither has it been frequently observed. It is of special interest just now because several pathologists, on account of the apparently extreme malignancy of the cells, are inclined to connect it with the next disorder in our list.

SARCOMATOSIS.

Under the popular title of cancer are included two important groups of malignant tumors which we know as sarcoma and carcinoma. For the poultryman, there is, and there need be, no difference between them; they are tumors, they are malignant, that is they steadily tend toward death. We may have in the liver a tumor nodule having the kind of structure that the veterinarian calls sarcoma; we may find several such nodules in the liver, and then we may speak of sarcomatous disease of the liver; or again, we may find one of these sarcoma nodules arising in the liver or elsewhere and resulting in the distribution of secondary nodules of the same kind throughout the body and especially in the internal organs, it is this that we call sarcomatosis. It is in this form particularly that we get the necrotic areas in the liver.

CARCINOMATOSIS.

From the description given of the preceding disease you will readily understand that carcinomatosis is a generalized condition of tumor-nodule formation of the type known as carcinoma or true cancer. By the naked eye these nodules are not likely to be distinguished from those of sarcomatosis. Carcinoma is the type more likely to occur in the ovary of hens, and may perhaps have its origin in the irritation resulting from prolonged efforts to develop a great egg producing strain. I quite frequently see cases of hypertrophied ovaries from such a cause. If in a hen that appeared to have a hypertrophied ovary you found cancerous nodules scattered throughout the liver and perhaps other organs, you would be justified in calling the disease carcinomatosis, the ovary being the starting point of the carcinoma and the liver showing secondary cancer growth.

COCCIDIOSIS.

Before we turn to that never ending subject of White Diarrhœa, or, as I prefer to term it, Coccidiosis, permit me to emphasize the fact that I believe I have, this morning, summoned to my aid enough diseases of an infectious or malignant character to demonstrate the unwisdom of calling all diseases of the liver that present whitish or yellowish spots by the one name of liver disease, and attributing them all to the one cause of over feeding or improper feeding. When you have disease-producing germs associated, as I have shown you above, with certain definite diseases, you must recognize the relationship between the germ and the disease as cause and effect; and to get rid of the disease you must get rid of the germ causing it. It is so with White Diarrhœa or Coccidiosis.

Q.—Will you suggest a method of treatment for these coccidia?

A.—If this disease exists on your place, do not fail to give the flock, once or twice a month, a dose of Epsom Salts, estimating one-third of a teaspoonful to each adult bird. (We do not use Epsom Salts so freely in cold weather, but on the approach of March we begin its use.) What you need, when you have intestinal affections such as we are now considering, is to use it quite frequently.

Mr. NIX: Do you not often notice with apparently healthy chickens that a very high percentage are affected with the coccidium?

A.—I think a chicken carries it about as an every-day-inhabitant of the cecum.

The CHAIRMAN: You have found that all chicks that die of White Diarrhœa, die of Coccidiosis.

A.—The presence of Coccidiosis to such an extent as to cause death is brought about by probably two conditions: one is the actual exposing of the chicks to the infection of the Coccidium, the other is the fact that the chicks are so low in vitality.

Q.—Are the two things necessary? Will the Coccidium make the disease where it is otherwise a healthy chick, or does it require a chick of lowered vitality, in order to increase to such an extent as to cause death?

A.—To the two parts of your question I answer, respectively, yes and no.

Q.—Have you in your microscopic examination made tests between chicks that have been incubated under healthy conditions compared with chicks where it is present, or have you only dealt with outside chicks?

A.—I have made no tests with incubation. Such tests are absolutely necessary before some of these questions can be settled, and that is why I call for a poultry pathologist at every poultry experiment farm.

Q.—You are inclined to the conclusion that infection is very much more serious, and almost the origination cause rather than the weakened constitution of the chicks exposed to the infection.

A.—Yes, to a certain degree.

Q.—What degree?

A.—Every one of us is satisfied that the man who is perfectly well is better off in his conflict with disease than one who is weak; that is a self-evident proposition. But that principle of the well-nigh all-sufficient defensive powers of health which you have in mind, while perfectly applicable to adult life suffers considerable modification when referred to infantile life. The delicate epithelial lining of the chick's intestine is an easy prey to Coccidial attacks.

Q.—On that ground, is it not more important to keep yourself healthy and strong than to be trying to dodge these numerous germs?

A.—That is so. But then you must recognize that the organism does the damage, and that it is that particular organism that you avoid by that increased vitality. It is a simple principle of warfare: you must first of all recognize your opponent in order to know how to meet him offensively or guard against him defensively.

Prof. Graham: One is the major and the other the minor; which is which?

A.—Suppose you are out camping. You have food, you have it prepared for cooking, you get together some chips and other dry material; you are ready now to start your fire but there is not a match to be found. What do you regard as the important thing? At twenty minutes to nine this morning I stood at the post office in that driving snow storm, and not a car there. I said to myself, "I am like Mark Twain, when from the scene of a railroad accident he telegraphed to a waiting audience, 'I have every motive to come to you except a locomotive.'" I think you all see the point. In the case of the fire you have all the predisposing causes of the fire; the exciting cause is that match, and if you do not get that exciting cause you won't have your fire. The coccidium is the exciting cause; it is the match. You cannot have the fire of coccidial inflammation, that is to say, Coccidiosis, without the coccidium.

The Chairman: You say you have the organism in almost every living chicken?

A.—I should hardly feel safe in saying that; but we will let it go at that. Now, the existence of the coccidium in the intestines of the chicken must have a beginning. If that beginning occurs in the very earliest period of chick life, owing to the very delicate character of the chick's tissues, there is certain to ensue a necrotic or canker-producing inflammation of the ceca, causing a more or less complete plugging of those portions of the intestines and, consequently, death. If, on the other hand, this beginning occur in later life, the results may be somewhat different. Here, for illustration, is the intestinal tract laid open to expose some of the epithelial cells. The strong chicken and the weak chicken possess alike these epithelial cells. Floating about, in the intestinal contents, are certain coccidial bodies which break up finally into sporozoites. Each one of these sporozoites, having power to enter a healthy cell, now proceeds to attack one of these epithelial cells. If hundreds of these sporozoites are set free to attack this epithelial lining, there will result a pouring out of mucous, and your chicken will have an intestinal catarrh. This occurs whether your chicken be strong or weak. If the chicken is a strong, healthy bird this intestinal catarrh will bring about merely a weakened condition of the bird. If, on the contrary, the chicken is one of low vitality or just recovering from roup or some such disease, the simple intestinal catarrh produced by the coccidia may be sufficient to kill it. But in addition to the effect of the attack itself, here are some cells greatly swollen by reason of the coccidia entering and developing within them. These cells become more or less torn, and you now have the whole body of the chicken exposed to the entrance of any harmful bacteria that may be in the intestinal canal. The same thing occurs when you scratch your hand; your body is exposed to the entrance of pus germs that may be floating about in the air. Furthermore, some of these bacteria when thus vegetating in the tissues which they have attacked, generate very deadly toxins. As a result, some of the stronger chickens that, at night, do not appear sick, are dead in the morning, due, in all probability, to the rapid development of septicemia or a quick poisoning of the body by toxins.

The Chairman: Have you found an abnormally large unabsorbed yolk and have you found the umbilical cord contracted?

A.—Unabsorbed yolk was present in only about half my cases of White Diarrhœa.

Q.—Have you examined the condition of a healthy chick as to the amount of yolk

A.—No; because I have not had enough chicks to examine.

Q.—How can you say definitely that the chicks that you have examined have not been troubled with unabsorbed yolk

A.—If, at the autopsy of a chick, I find associated with a disease a micro-organism that has been demonstrated to be disease-producing in other animals, and if, in connection with its presence in this chick, I find results that are identical with the results of its presence in other animals, I am compelled, according to scientific methods, to assume that that organism has been the cause of disease and death in the chick that I am examining. When I find the ceca filled with cheesy matter, and when I find that by laying back the wall of the cecum and scraping it I can obtain hundreds of these coccidia, then, if I know that in the rabbit such cheesy matter is due to a like organism, I must admit that these plugged ceca in the chick are due to that same micro-organism. I find coccidia alike in both rabbit and chick; I find similar cheesy material associated with the coccidia in both rabbit and chick; there is no unabsorbed yolk in the rabbit, therefore, unabsorbed yolk, as a cause, must be thrown out.

Q.—Why is the coccidium so increased in one case and not in the other; it must be due to some cause outside the coccidium?

A.—I see what you mean; but as a means of coming at the cause of disease you are wrong. The position you take is absolutely unscientific, and if assumed by physicians would destroy the whole fabric of medicine as we understand it to-day.

Q.—Why?

A.—Because you introduce as a specific causal factor something prior to the exciting cause which is itself the only specific causal agent.

Q.—Doctors admit the fact that many patients have a disease that probably the majority of patients do not die of, but the presence of that disease gives rise to other diseases which are the terminal causes of death. Faulty incubation might be the grounds upon which the coccidium lives. I want to find out how to get chicks that will live.

A.—Pneumonia, as a terminal disease, carries off a large number of sufferers with diabetes. That fact, however, does not make diabetes an *essential* factor in pneumonia infection. Quite healthy men are sometimes attacked with pneumonia and succumb. The cause of pneumonia is the pneumococcus. Just say that Professor Edwards, of Guelph; Dr. Hadley, of Rhode Island Experiment Station; Dr. Morse and others are right when they say that the so-called White Diarrhœa is a Coccidiosis, and that the coccidium is the cause of it. Admitting that, we can then, together, investigate the results, immediate and remote, of faulty incubation and also seek out the source of these coccidia.

The CHAIRMAN: I am perfectly free to admit that you find this coccidiosis; but why is it there? That is where we differ.

Dr. MORSE: Then I take it that you are willing to admit that White Diarrhœa is, or appears to be, intestinal coccidiosis.

A MEMBER: Everybody admits that, but we want to know why it is there?

The CHAIRMAN: I believe that what we have got to attack is something behind the Coccidiosis. Do not believe that I am converted.

Dr. MORSE: If I were held on a criminal charge, I should want no better lawyer than Mr. Baldwin.

Mr. MCGREW: I think it would be a dreadful thing if Dr. Morse should return from here and think that any of us did not believe him. I think we all believe him thoroughly, but we want a cure.

The CHAIRMAN: I think this has been a most entertaining and instructive address, and no one appreciates more than I do the work Doctor Morse has been doing. One cannot meet Doctor Morse without appreciating the work he is doing, and I thoroughly endorse what Mr. McGrew said. I think we all thank Doctor Morse very heartily for his frank discussion, and the information he has given us in such an able, scientific way.

POULTRY IN EASTERN COUNTIES.

BY VICTOR FORTIER, C.E.F., OTTAWA.

My embarrassment in appearing before you is greatly increased by the fact that I must use a tongue in which I am painfully conscious of being very deficient, and I sincerely apologize for disfiguring so badly your beautiful language.

Allow me, however, to offer my most sincere thanks to the Minister of Agriculture, Hon. Mr. Fisher, who kindly permitted me to accept the most kind invitation of the President, Mr. Creelman.

Following the advice of Prof. Graham, whom I had the pleasure of meeting at the Ottawa Exhibition on the 20th January last, I have changed the subject I had intended to put before you, and I will briefly outline the present state of the poultry industry in Eastern Canada, principally the Province of Quebec, and by giving you the results of some personal experiments, point out some of the causes which, in my opinion, are hindering the rapid expansion of that important interesting and profitable branch of farm work.

Looking at the official figures, we see that in 1901, the number of poultry in the whole Dominion, was 17,922,658 at the present time, Ontario has about 12,000,000 of farm birds and at Quebec at least 5,000,000.

Those figures speak for themselves, and show that the farmers throughout the Dominion are becoming aware of the possible profits to be realized in the poultry industry which is developing in Canada, where there is still an abundance of room and opportunity for further extension.

Almost everywhere the demand exceeds by far the supply, especially in Montreal, Quebec, Three-Rivers, Riviere-du-Loup, Sherbrooke, etc.

However I must say that it is rather the quality than the quantity that is lacking, and that our farmers are trying earnestly to remedy the deficiency by replacing gradually the common hen by our excellent, varieties noted for their egg and flesh producing qualities: Plymouth Rocks, Wyandottes, Orpingtons, etc. etc.

You all know, that the commercial value of the products of the poultry industry has been in 1901, $16,010,718; of that amount, Ontario has received $8,881,387, and Quebec $3,173,634.

If we consider the climatic conditions of these two large Provinces, we shall have to admit that they are much more favorable in Ontario, and that the big difference shown by the above figures is not so abnormal as it looks at first sight. In Ontario, where the climate is much milder, poultry raising can be started earlier and consequently yield a bigger percentage of profits. Here, your chickens are almost ready to be placed on the market when in Quebec, our farmers are just starting incubation. In autumn, your birds can still run out of doors, when in Quebec, they are already confined five or six weeks in their winter quarters.

In spite of those unfavorable circumstances, I am sure that there is as much enthusiasm among the poultry breeders of Quebec as among those of any other Province. If in Ontario, the production of 5 lbs of chicken flesh causes as much enthusiam as the production of 1,000 lbs of beef in Quebec, the successful producer of 5 ounces of feathers is as proud and enthusiastic as the breeder of cattle who hopes to obtain a first prize at the exhibition.

There are at the present time in the Province of Quebec six poultry associations, which hold yearly exhibitions at Montreal, Quebec, St. John, St. Jerome, Granby and Victoriaville. We hope that in the very near future, as a result of the efforts of the Provincial Government, we shall see a dozen others in that Province.

In addition to these local exhibitions they have in Quebec the provincial and county exhibitions, where many splendid specimens of poultry and of the products of the poultry industry, are to be seen.

What our Province of Quebec is lacking most is a fair supply of literature upon the subject of poultry culture. There is not a single periodical entirely devoted to the subject. However, "Le Journal d'Agriculture," 75,000 copies of which are published monthly by the Provincial Government, a paper which is read mostly by farmers, endeavors to do its best in that direction in devoting as large a space as possible in its columns to that important industry. Several of our big daily papers seem to take an interest in the question, and we are told that we may expect very soon the appearance of the first poultry review in the Province.

The Agricultural School of Oka and the Macdonald Institute of Ste. Anne de Bellevue, possess a very important poultry division which takes every day more and more extensions.

Every year the lecturers on agriculture give through the Province some fifty lectures on poultry, and it has been noticed that the most popular branch of the farm work is poultry keeping.

In those lectures we endeavour to impress our farmers with the necessity of being very prudent in undertaking and managing that industry. We especially recommend them to begin on a small scale and to increase gradually their flock. We advise them to start by keeping from 50 to 150 hens, to hatch annually from 100 to 200 chickens, and not to undertake the poultry culture on a large scale before they have acquired the experience and a thorough knowledge of management, essential to success.

In the Province of Quebec as well as elswhere, it is the inexperienced and ignorant would be poultry keepers, who have injured that industry. Knowing no better, they start on small pieces of land, in village, town or city lots, with any variety of fowls, unsuitable poultry houses, too small, badly ventilated, etc., and they are very much surprised when they fail in their undertaking.

Their failure frightens many good farmers who are thinking of trying their hand and see only the results without knowing the causes of that failure.

Others want to imitate our active neighbors from the U. S., but as they do not take sufficiently into account the differences of climatic conditions, their failure is just as complete.

Another very important cause which hinders in Quebec the development of poultry culture, is, I think, the erroneous idea handed from father to son that the hens must be kept in heated poultry houses in winter, not only to have them laying eggs, but also to keep them in good condition. As you all know, gentlemen, experience has shown that such is not the case.

Our modern poultry houses, built with a single thickness of boards with the south side covered with a cotton front, and provided with a comfortable roosting room for the night, or any other poultry house of the same kind, with a ceiling of straw, give the best satisfaction even in our coldest regions. This style of poultry house is adopted almost everywhere. They are found very satisfactory, and the hens lay as much and thrive in every way better than in the artificially heated houses, which are much more expensive.

Two other causes, and I dare say the most important, of the failure in many cases, are, the want of careful selection of the laying hens, and the late incubation of birds intended for breeding stock.

The hen hatched early. will give reasonable profits the two first years and even the third year, whilst a late hatched hen will never furnish any returns worth while.

The egg production is not dependent only on substantial and rational feeding, but also on several other conditions which form a very important part of the knowledge required by the successful breeder.

It is possible to insure and to add to the laying propensities of the hen by simply proceeding with the incubation one to two months earlier in the spring. Experience has proven that pullets hatched before the 15th of May, often start laying in October. If a well appropriated and well balanced ration is given there will be an abundant yield of eggs in November and December.

It is, of course, understood that we suppose that an intelligent and careful selection has been made, for we must never forget that weak and degenerate birds, though bred from an excellent variety, never gave as many eggs the first, nor even the following years, as those that have grown and developed normally. Late hatched pullets are no better than delicate and ailing ones, they are both bad layers.

In order to be sure that poultry raising will be profitable, the following rules are most important:

1. Consider the conditions of climate and atmosphere.
2. Chose with care the breeders, by practicing a close, and intelligent selection.
3. Have the birds hatched early.
4. Take into consideration the health of the birds.
5. Feed the birds intelligently and observe the golden rules of hygiene.

Experience is more instructive and more conclusive than the very best of theories, and therefore, I thought it would be interesting for you to hear the results of experiments conducted by myself with the greatest of care at the Experimental Farm of Ottawa, during the last two years.

My first experiment was conducted with 8 pullets, 4 Plymouth Rocks and 4 White Wyandottes, hatched between the 15th of May and the 1st of July, 1906. These 8 pullets were normally developed birds, and had been kept during the winter in an artificially heated poultry house, where they occupied a space of 6 feet by 9, or 54 square feet, giving each bird about 7 square feet. During summer, they had daily the run of a yard 6 feet by 48, and every three days they were allowed on a plot of well shaded land measuring 75 feet by 75, where they found an abundance of green grass, insects, etc. etc.

These pullets received the following rations:

Grain: half oats, half wheat, distributed morning and evening in winter in the litter.

Cut green bone, at mid-day every three days.

Mash at mid-day every three days.

Green food (mangels, turnips, etc.), at mid-day, every three days.

2 pt. shorts, 1 pt. g. oats, 1 pt. g. barley, 1 pt. beefscrap, added after the 6th of May to replace cut-bone.

Grit, oyster shell and water were always in supply.

8 PULLETS HATCHED BETWEEN THE 15TH OF MAY AND THE 1ST JULY, 1906.

4 White Plymouth Rocks and 4 White Wyandottes.

Varieties.	Hen No.	1907							Eggs laid.	Remarks.
		Feb.	Mar.	April	May	June	July	Aug.		
W. P. R....	12	......	9	11	7	......	.....	......	27	Dead May 10.
"	31	13	2	5	3	4	......	......	27	" July 1, light.
"	80	2	1	6	7	......	10	7	33	
W. Wy.....	72	......	5	4	3	......	5	6	23	
"	78	......	1	1	......	......	......	......	2	" May 16, "
"	88	......	......	......	......	......	......	......	......	" " 1 "
"	90	....	7	12	5	......	......	1	25	
"	97	14	12	4	5	.....	......	......	35	
Total....	....	29	37	43	30	4	15	14	172	Average 24½

The results as shown in the adjoining chart, give an average of 24 eggs per hen. I must add that in this experiment, as in all the others, we made use of the trap-nests in order to ascertain the individual qualities of each hen.

Those pullets commenced to lay only in February, and one died in May without having laid a single egg. Moreover, 4 died during the year though they appeared in good health during the spring and winter. They died not of tuberculosis, but of that disease called "light," weakness of constitution, or lack of vitality.

If we compare those rather poor results with those of a second experiment conducted under the very same conditions of wintering, space, and nourishment, it will be clearly seen that the time of hatching is a very important factor in the obtaining of profitable returns, although it is not the only cause of success. If pullets hatched early suffer from an arrest of their normal development, they will give poorer results the first year than those hatched later but whose growth has not been hindered.

For this second experiment we took seven pullets, 4 B.P.R. and 3 White Wyandottes, hatched between the 5th and the 25th of May. These pullets for some reason or other had not grown normally, they commenced to lay only about the end of January and give the small average of 15 eggs per bird, whilst the pullets of the same hatch but which had grown up normally, produce a number of eggs four times as large.

The two adjoining tables give the details of the experiment.

7 Pullets Hatched between the 5th and 25th of May, 1906.

4 Barred Plymouth Rocks and 3 White Wyandottes.

Varieties.	Hen No.	1907								Eggs laid.	Remarks.
		Jan.	Feb.	Mar.	April	May	June	July	Aug.		
B. P. R. .	21	......	......	......	......	1	......	......	......	1	None dead.
" ...	24	......	......	......	......	......	......	......	......	......	
" ...	48	......	......	......	......	1	......	......	......	1	
" ..	57	......	1	9	11	5	......	......	......	26	
W. Wy...	7	7	9	7	10	8	......	6	4	51	
" ...	35	......	2	7	12	9	......	......	......	30	
" ...	63	......	......	5	......	2	......	......	......	7	
In straw .	....	......	......	1	2	......	......	......	......	3	
Total..	....	7	12	29	35	26	......	6	4	119	Average 15½

All those birds appeared to be in excellent health.

Same Birds Second Year.

6 Hens, 2 years from 1st of November, 1907 to 31st Oct., 1908.

Varieties.	Hen No.	1908									1907		Eggs laid.	Remarks.
		Jan.	Feb.	Mar.	Apr.	May	June	Jly.	Aug.	Sep.	Nov.	Dec.		
B. P. R...	21	....	....	....	....	....	....	....	....	....	....	....	......	Dead Nov. 16.
" ..	24	....	....	8	12	....	....	....	....	....	....	6	26	" May 26.
" ..	48	5	....	1	....	....	....	....	....	....	....	....	6	" Mar. 26.
" ..	57	9	4	4	....	....	....	....	16	....	....	4	37	
W. Wy...	7	....	4	....	....	3	4	....	13	....	....	....	24	
" ..	35	21	16	11	11	10	....	7	....	....	....	11	87	
" ..	63	6	6	7	9	4	....	8	13	3	2	14	72	
" ..	80	....	11	3	4	....	....	....	....	....	1	8	27	
Total..	....	41	41	34	36	17	4	15	42	3	3	43	279	Average 40.

No. 21 B. P. R. dead the 16th November, 1907, was replaced in order to continue the experiment by No. 80, W. Wyandotte, dead the 16th of May, 1908.

Those miserable results having given us but very little satisfaction, we undertook in 1907 and 1908 another experiment, choosing 9 pullets hatched about the 12th of June, 1907, 3 barred Plymouth Rocks and 3 White Wyandottes with 3 Buff Orpingtons. These 9 pullets were normally developed, under exactly similar conditions as those of the other two experiments, same poultry house, same space, same food and same care.

The results were far from being satisfactory as we only got an average of 31 eggs per bird, as shown in the following table:

Third Experiment.

9 Pullets, 3 Barred Plymouth Rocks, 3 W. Wyandottes and 3 Buff Orpingtons, hatched about the 12th of June, 1907.

Variety.	Hen No.	1908							Eggs laid.	Remarks.
		Feb.	Mar.	Apr.	May	June	July	Aug.		
B.P.R..........	8	......	1	10	6	......	7	2	26	
"	26	4	3	......	.....	......	......	......	7	Dead 29-11.
"	36	......	4	5	......	......	7	6	22	
W. Wy.........	51	11	7	14	8	......	7	......	47	
"	54	9	3	18	18	......	8	8	64	
"	57	13	3	......	......	......	......	......	16	" 22-4.
B. Orp..........	61	......	4	7	......	......	......	......	11	
"	75	12	12	17	4	......	......	......	45	" 16-7.
"	99	4	......	14	17	......	8	......	43	
Total.......	......	53	37	85	53	......	37	16	281	Av.: 31 eggs.

You will readily agree with me, gentlemen, that hens which lay an average of only 15 to 30 eggs the first year and 39 the second, do in no way pay for their keep, and certainly do not cover expenses. And yet a large number of our farmers will keep such birds over winter, expecting to get a fair yield of eggs or a good weight of flesh.

It is also important to remark that mortality is much greater among late hatched birds than among the early hatched ones.

It might be possible, perhaps, to get better results, where the climatic conditions are more favorable, but our experiments were conducted with all possible care, and I do not believe we could improve on them in our district.

A good poultry breeder should then be most careful in the selection of the birds he intends keeping over winter. He should not hesitate for one moment to sacrifice not only the late hatched, that is those hatched after May, but also those birds whose growth for some reason or other has been held back, or which have not attained their normal development, not only during the first weeks, but also after three or four months.

Following are the results of another experiment with 10 Barred Plymouth Rock pullets, carefully chosen, hatched between the 5th and 20th of May, whose growth, for some unknown reason, had not been normal, and which had developed very slowly after the age of three months, that is until after the month of July. Extraordinary care was bestowed on them, and the ration already mentioned given them regularly.

These pullets were in an artificially heated house, and had in winter a pen measuring 8 feet by 9, or about 7 square feet per bird. In summer they had the run of a piece of land 12 feet by 48, that is 56 square feet per bird, and every three days they were allowed to roam in another piece of well shaded land measuring 75 feet by 75, where they had an abundance of green grass, insects, etc.

The tables show the details of the results for the first and second year.

10 BARRED PLYMOUTH ROCKS HATCHED MAY 5TH TO 20TH, 1906, SLOWLY DEVELOPED, AFTER THREE MONTHS.

Hen No.	1907									1906	Eggs laid.	Remarks.
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Dec.		
9	......	16	1	20	4	......	......	......	......	......	41	First year.
10	4	5	12	12	10	......	......	......	......	......	46	
12	......	15	5	20	6	......	1	5	......	......	52	
15	1	1	8	9	16	......	6	6	......	......	47	
19	......	......	5	......	13	......	12	......	5	......	35	
25	......	5	5	9	11	......	2	3	2	......	37	
32	8	7	15	14	12	5	8	1	......	......	70	
35	20	20	17	8	......	12	3	14	......	1	95	
66	......	......	......	......	10	......	3	7	......	......	20	
78	8	15	9	12	......	......	11	13	6	......	64	
Total.	41	84	77	104	82	17	37	49	13	1	505	Av.: 50½.

SAME BIRDS AS FIRST YEAR.

Hen No.	1908										1907	Eggs laid.	Remarks.
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.		
9	.....	.....	14	6	.....	.....	.....	3	1	.....	.....	24	
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......	Dead 6-3-08.
12	16	7	6	8	8	.....	.....	.....	.....	.....	12	57	
15	.....	.....	18	13	10	.....	.....	.....	.....	.....	.....	41	
19	17	14	12	9	2	.....	.....	.....	.....	.....	5	59	
25	.....	6	8	11	.....	.....	7	7	.....	.....	1	40	
32	4	7	15	15	7	7	7	.....	.....	3	1	64	
35	17	14	17	7	.....	14	10	7	.....	.....	17	103	
66	7	3	9	13	10	2	8	.....	.....	.....	5	57	
78	20	19	15	18	2	.....	15	5	1	.....	15	110	
Total.	81	70	114	98	39	23	47	22	2	3	56	555	Av. (for 9): 61.

Allow me now to put before you, some results obtained with birds of the same breed, same strain,, but hatched in the beginning of May, and which we shall compare with the results of the previous experiments.

In 1906-1907, 24 pullets, Barred Plymouth Rocks, wintered in cold poultry houses, gave an average of 68¾ eggs, of which the greater part were laid in winter. With 22 White Wyandottes, we got an average of 76¼.

18 Barred Plymouth Rock hens gave an average of 70 eggs, and 14 White Wyandottes an average of 104.

In 1907-1908, 19 Buff Orpington pullets gave an average of 92; 14 Barred Plymouth Rocks 85; and 10 Wyandottes 97.

As you can see, the egg production of early hatched and well developed birds, was from 20 to 60 eggs larger per hen.

Those experiments prove clearly, that by ridding our pens of every puny and delicate bird, and by early hatching, we could raise the egg production 100 per cent., and have at the same time a much better fowl for table use.

Aviculture is a most wonderful industry. The hen is a piece of delicate, extraordinary, fragile and complicated machinery. She possesses the marvellous property of converting the rough food into the most delicate and delicious products. But, like all fine and delicate machinery, she can be kept in good working order only by the greatest of care, close and intelligent attention to detail, and constant study on the part of the breeder and amateur.

It is a great mistake to start in the poultry industry without special knowledge, and certain failure awaits those who are not intellectually well equipped when entering into the business.

A certain amount of scientific knowledge is required to succeed in artificial incubation, in order to produce healthy and vigorous chicks, easy to rear, with good dispositions to rapid growth, so essential to success; to bring the young pullet to full and early maturity; to promote the laying propensities of the pullets at the most profitable season; to distinguish the laying hen from useless hen-house tenant, that we may be able to give our care and attention to the former only; to be able to pick out the hen whose organs are not overtaxed by the laying, and whose eggs will produce large and healthy strong chicks; to compound appropriate rations necessary to promote growth, laying, moult, fattening, so as to furnish the food elements required under those various conditions, without causing any prejudice to the delicate organism of the bird.

The poultry breeder and fancier should then try and acquire at least the elements of those sciences which have their application in poultry raising: Zoology, physiology, anatomy, physics, chemistry, veterinary science, etc.

In conclusion, I will say with E. Leroy, in the preface of his book, "Traité de la Poule Pratique:"

"Beware! Poultry raising is a most insidious undertaking. We start with the practical hen, we finish with the fancy bird. Practice often leads one by a natural bend to artistic breeding, artistic is no exaggeration, for a pure bred and faultless hen is a true, living work of art. Then, regardless of sacrifice and pain, you will hold it an honour to figure in the poultry shows, those peaceful battle-fields, which we sincerely hope will be the only battle-fields of the future. You will struggle to gain and wrest from the already crowned specialists the proffered reward, and help to hold flying in the breeze the beautiful flag of Aviculture.

Q.—How much each do these birds cost you to keep for the year?

A.—Just as much as the other, 85 cents. The bird that gives but few eggs costs just as much to keep as the bird that lays a number of eggs.

Q.—We would like to know how you pick out these good pullets?

A.—I would never keep for laying purposes a pullet that had not grown up normally. It is perfectly impossible to pick out a pullet from its appearance.

Q.—Do you believe that there is anything in the type of a bird?

A.—In many cases the birds we have at the Experimental Farm of the worst type give the most eggs.

Q.—Is there any similarity in type of good layers of all breeds?

A.—I am not prepared to answer that question. In our White Wyandotte and Barred Rocks or Buff Orpingtons, in one case last year a White Wyandotte laid 192 eggs. It was a small little bird that had more of the Plymouth Rock shape than Wyandotte. She was strong and healthy, but she had a bad shape. I have heard it said that a hen with a long body would lay more eggs than a hen with a short body, but this is not so.

Q.—What about the size of the comb?

A.—I put more importance on the size of the head.

Q.—Big head or small?

A.—Small head. As a rule, the hen with a big head is a lazy bird.

Q.—Do you find these short hens lay as big an egg as long hens?

A.—We weighed the eggs from that little pullet and from that hen; and from the little pullet the eggs weighed one pound ten ounces and the eggs from her sister weighed one pound eleven ounces.

Q.—Were they hatched in incubators?

A.—Yes.

Q.—Do you find any difference in the laying qualities of those hatched in incubators and those hatched by hens?

A.—No difference.

Q.—You lose more incubator chickens than you do hen hatched?

A.—We lose more in the incubator than under the hens.

Q.—Do you have as much trouble with the hens as you do incubators?

A.—No

Q.—Did you ever weigh this small hen?

A.—She weighed six pounds and three-quarters.

Q.—I would not call that a very small pullet?

A.—That is the weight. We raise them up to 7½ and 8½ pounds.

Q.—Which lays the biggest eggs, your Plymouth Rocks or your Wyandottes?

A.—All depends on the strain. Our Plymouth Rock eggs weigh about one pound ten ounces or eleven ounces per dozen, about the same as the Wyandotte, but I must admit that the White Wyandotte pullets lay a smaller egg for a certain length of time.

Q.—Do the pullets which begin to lay first usually lay the most?

A.—I did not carry on a special experiment in that, but I am satisfied the pullet that begins to lay in October or November will give more eggs.

Q.—Do you not find that full sisters will vary very much in laying qualities and the color of egg?

A.—We have had some breeds that would lay only 15 or 25 eggs in a year, and others lay 90, 120 and 175 eggs.

Q.—I do not understand how it is that these hens that do not lay any eggs cost as much to keep as the others?

A.—That is the reason why we should select our breeding stock.

Q.—Did your Wyandotte pullets lay a darker egg one day than another?

A.—Yes, there is a little difference in the color of the shell.

Q.—Did you ever notice that the color of the shell is influenced by feeding?

A.—We did not carry on any experiments in that.

PROF. GRAHAM: In changing from feeding Ontario wheat to No. 1. hard Manitoba wheat, we had each hen's eggs lined up in the office for the purpose of seeing how many were laid, etc., and you could see the difference in the color of the egg the day we changed the feed.

Q.—Do you find that the hens that lay the largest number of eggs moult late?

A.—No; our birds moult in August and September. We find we can make pullets, hatched in June, moult in August and September, and our early pullets, hatched out in April or May, begin to lay in November, and they lay all the year round until the month of July and then moult through the hot months of the summer, and they are ready to lay next year in October, November or December.

Q.—Do you find that the hens that do not lay put on flesh instead of laying eggs?

A.—Yes.

PROFITABLE POULTRY FARMS.

By C. K. Graham, Hampton Agricultural Institute, Va.

I do not know how broad we can make this subject, but I think possibly it is wise to make the introduction broad enough, so that we can get away from it a little bit, and I would like to say that one or two questions that were asked previous speakers have given me a chance to introduce some things I would like to explain.

I will talk chiefly of the State of Connecticut where I was in the poultry work. There I consider the climate and the temperature about what it is in St. Catharines. We have had it as low as three or four below zero in four years. It very seldom goes below twenty above zero: Once in a while it drops to ten above. We have sleighing probably two or three times throughout the year. It would be the exception to find over one or two cutters sold in a year in a city the size of Guelph.

Q.—Is it just as hard to get eggs in November, from your hens in Virginia as it is in Canada?

A.—In Virginia, we find things altogether different. The coldest day we had in Virginia was a week ago last Sunday, and it was just about like last Sunday here; the temperature was 26 above. We are right on the seashore. The land is low in the section I am in, and the poultryman there wants to hatch his chickens now so that he can have them fairly started before the hot weather of May reaches us. In fact most of his chickens are hatched, and the problem we have to face there is that these chickens are going to lay in August, and I cannot see how they are going to help moulting early in the fall.

In Connecticut, we have to be careful not to get February or early March hatched chickens. We want our chickens hatched between the 15th of March and April. Our friends from Ottawa speaks of the cold climate being a disadvantage—you people here are wonderfully blest with climate. Do not forget that when you get further south, you are wonderfully blest with other things beside climate. The lice will breed faster than you can kill them. Anything in the line of parasites is with you always. We find also, that we have what you call roup in abundance. In Virginia, I found they kept every window in the house closed tight. Naturally we use colored men and the colored man likes everything warm, and he shuts the windows up tight in the middle of September, and their roosting coop are very small. I find nearly every person who keeps chickens keeps them shut up in that way.

In New England, I found two or three peculiarities. One is that they had the gapes in one-half of Connecticut and in the other half they had never known of the gapes. The Connecticut River runs down through the State, and I have never seen a case of the gapes east of that river, and west of the river there is plenty of it.

You have been speaking of tuberculosis. If we have it, we do not know it. We have low vitality and lots of our chickens die. I think our percentage of culls is as high as yours, but the only case of tuberculosis our people have been able to find is a case in the western part of the State. One of the breeders saw some of his chickens with two or three ulcers under the wing and on the thigh. I sent it to a noted chicken doctor and he telephoned and said it was a straight case of tuberculosis; he had been able to find the germ. And a day or two ofter we got another and I went out to the man's place to see what was the matter. He was a thrifty German and had Silver Laced Wyandottes. He had a nephew who came from the city of New York in the last stages of consumption. They told him it would be a good thing for him to get out in a poultry plant. He had been expectorating in that poultry plant, and that we think is how that chicken contracted the disease. I think there is no doubt whatever there was a case of tuberculosis simply from coming in contact with the excreta of that man.

Another trouble we have had is what we call chickenpox. I remember one case in particular where a flock was all broken up by the disease, and on investigation, we found that it could be traced to a German servant girl who had the disease. It was in the fall of the year, and they thought it was roup. Happening to look at the girl the doctor saw a sore on her face and taking a scab from the sore, he produced the same toxemes that we were producing from the chickens. The birds contracted it from the fact that she had eaten some watermelon, and had thrown the rind over the fence to the chickens.

In Connecticut the people keep poultry as you keep cows. It is the main industry of the State. I suppose there are more people keeping poultry for a living in the State of Connecticut than there are in any of the other branches of agriculture. Some of them are fanciers, others utility. Very few of the utility men have any use for the fanciers, and yet I firmly believe if it were not for the fanciers they would go to pieces. The average man who is in the poultry business there, and who went in to it purely with the utility idea, really has no love for the chicken and does not appreciate them and does not know their good points; he is unable to tell a good healthy bird when he sees one, and the result is that in two or three years he is out of the business. He will follow up every idea that anybody suggests. But when we get hold of a good fancier, and turn him into a utility man, he is a stayer, he knows the value of the bird, and he does not have to take other people's advice.

We have the soft roaster trade and the broiler trade and the egg business and by no means least, the squab business. However, there are very few left in either the squab or the broiler business. When I went in there, the State was full of the latter. I do not think that even down in Virginia there are broilers being grown to any extent to-day. They have practically given it up. I do not think the incubator men have boomed the broiler business the last few years as they formerly did. Most men who took up the broiler business started in after reading incubator catalogues.

Q.—What is the matter with the broiler business?

A.—I will tell you what I think. It is one of the get-rich-quick schemes. It looks easy to turn money over rapidly, and if you do not stop to inquire the cost, it is all right. But I am satisfied that one of the greatest leaks we have in that business is the amount of money we tie up in the equipment—the amount of capital required which lies idle seven months in the year. On the other hand, in our State practically the only time you can sell broilers to make any profit is in May, and that means a March chicken and February egg, and I cannot understand any man trying to hatch a February egg in order to double his money when he can get double the cost of the egg by selling it right on the spot.

Q.—What do you get for broilers?

A.—An average of 75 cents or 80 cents a pair. Once in a while you can find a man who peddles them out who can get as high as $1.25 a pair.

Q.—What is the price of eggs in February?

A.—35 cents to 45 cents.

Q.—How many broilers will a dozen eggs turn out?

A.—It takes four eggs to make a chicken.

Q.—Is that where the loss is?

A.—Yes, you have eggs that cost you at least three cents apiece to begin with, but don't forget that equipment which is depreciating in value daily.

Q.—When you hatch under the hen do you not get one chicken for every two eggs?

Mr. Robinson: I figure on getting ten liveable chickens out of 15 eggs.

Q.—How many hens could you set in the season?

A.—About twenty.

Q.—How many eggs under each hen?

A.—Nine, this time of the year; eleven when it gets milder, and thirteen in the warm weather.

Q.—Out of 230 eggs set, how many chicks will you hatch?

A.—I would get about 180 to 200.

The Chairman: I set 200 eggs in incubators and out of over 100 fertile I got 66 chicks. I cannot do it now, and I want to know why?

Mr. McGrew: In the case of a man who is hatching five or six thousand chicks to get two thousand layers, what is he going to do with the cockerels?

Mr. Graham: He has got to work them off, and of course the quicker he can sell the better. There is a difference between the farmer and the broiler man. The farmer goes to the city and takes what margin he can get. The poultry man is a man who understands his business, and he knows what his product is worth. I wish we could find more farmers who knew what it cost to feed a hen, and how many eggs they could get from a hen in a year. If you ask them what a pullet cost them, they do not know. They do not know whether they can replace a pullet with the money they get for the bird they sell. In this case the cockerel is a by product or should be considered such.

The Chairman: A man is running a poultry farm, and he wants to produce a certain breed of layers; would it pay him to turn off his cockerels for broilers?

A.—He will have to.

Down in Connecticut, we have two distinct plants, the intensive and extensive plants. One man keeps from fifty to one hundred birds per acre. Land in Connecticut is cheap. You can buy plenty of it from five to fifteen dollars per acre. You have the best of markets. You can get to either New York or Boston in four hours, so that they not only have every convenience as far as markets are concerned, but the State is flooded with would-be poultrymen and there are therefore always readymade plants for sale There are however a great many down there who have made a decided success, and with a few exceptions every one of these successful men have what I call the extensive plants. They use lots of ground; have a large, free, range; cutting labor down to a minimum.

Probably the most successful plant we have there is that of Mr. Tillinghast. He has in all about 3,500 birds, and last year he and his daughter ran the plant. The year before they kept a student. They fed the birds once a week, and never water them. A stream runs through the centre of the farm and the birds go to that stream, and when the snow is on the ground, they eat snow. At one time, he used wheat screenings, but he feeds straight wheat and corn now. He told me he kept no books. He had so much money last year, had more this year than last, and he was satisfied. However, that is all talk. I know that out of his 3,500 hens, he made better than $3,500, after allowing himself fifteen dollars a week, and his daughter ten dollars a week for living. And he charged up 5 per cent. for interest on investment and 10 per cent. on stock and 20 per cent. on equipment. He claims that equipment will go to pieces in five years. At the end of five years, he wipes his houses off the sheet, i.e., charges nothing for depreciation after that time.

Q.—How often does he clean these houses?

A.—Some of them have not been cleaned since I have been in Connecticut, four years. His houses are cheap. They are eight feet by sixteen feet and some ten feet by twenty feet. They are four feet high on the side; that gives them a roof of five feet three inches. He uses cypress lumber for the roof. He can get it for about $28 per thousand. He uses pine on the sides and pine on the ends. He builds his houses low, so that they will go under the trees. What seems strange is the vigor of the birds, and the hatches he can get; all your theory of cleanliness and fresh air hygiene are all gone.

Q.—Does he whitewash his houses?

A.—No, and he has not lice. I have heard him say he uses Blue Ointment, but I do not think he does.

One year he had a great deal of trouble with his chicks. Since then they are hatched in incubators, and he raises them under hens.

He has a theory that a good healthy hen won't have any lice on her. She will fight them off. He works on the theory that a hen must be contented to give best results. If you want a man to give you results, he must be satisfied with his position, because if he is not, he will be grumbling instead of doing his work. If you put a hen behind a fence, she will spend most of her time walking around to see through the fence. He claims that none of us know what the hen should have to eat, but that if we will give her free range, and a chance to clean herself, she will get all the variety she requires, if we put out a certain amount of wheat or corn for her.

The question is often discussed as to whether we give our hens too much grain, and whether it would not be better to give them more roughage. There is a point where the hen seems to be unprofitable owing to excessive labor and feed. A man I know who has a plant in Virginia keeps his hens out on an alfalfa field, on free range. They were yarded when I went there, clover was given to them, and ground bone brought to them. Now they have their hens out on alfalfa and are getting good results.

Q.—What percentage.

A.—I cannot tell you. We put three coops out on the field last year and the birds are all living yet and laying. There are 150 birds in this lot.

and we are now getting this month about 80 eggs a day; but I do not know what they did last month, nor what the other 1,000 did.

Q.—That man that has chickens and only feeds them once a week, does he put the feed in a box, and let them eat when they want to?

A.—Yes, puts the feed in boxes. He was feeding wheat screenings, but the food got so poor he began feeding wheat. His birds are all Leghorns. We had our doubts about this method and we built three houses just like this, and put them out on sheep pasture, and we took two more houses and put them on the other side in a marsh. We put Rhode Island Reds there because we had not enough Leghorns to fill the five houses. The first year the cost, not including labor, but including feed and interest on investment, was 7 3-8 cents per dozen eggs. From the Reds we got 109 or 111 per hen.

Q.—What did you pay for the feed?

A.—I think about $1.35 per 100 lbs.

Q.—Did you clean these houses?

A.—No, we did not. There are no dropping boards in our houses, most of us do without dropping boards in the State of Connecticut.

Q.—Are you advising farmers to keep hens that way?

A.—Yes, I am advising them to cut down the labor. Keep more hens and put less money in buildings and equipment. I advise him not to make himself a slave to the hen but let the hen work for him. During murky weather, if there has been a frost and it begins to thaw, we sprinkle land plaster on the manure. We cleaned these houses once a year and there was no foul odor and no great lot of manure.

The eggs from the Leghorns cost us 7 5-8 cents a dozen. Referring to the Rhode Island Reds, we had the mothers that had been kept in a warm house the year before in one house and in the other house we had their daughters. The eggs from the Reds cost us 7 3-8 cents. There was a difference of 2-8 cents in the cost of the eggs from Reds and from the Leghorns. The eggs from the old hens cost us about 16 cents, or nearly three times as much as the eggs from the pullets. I am sorry to say we had no trap nests in either of these houses. I would like to know whether there were just one or two old hens there, that did not lay.

We had no running brook but there was water four hundred yards from some of the houses. That winter we had snow one week and the next week none at all and the ground would be frozen solid. We did not bother carrying any water to the hens; we just let them go and the egg production was not noticeably effected. We carried nothing to them but wheat screenings, beef scrap. Shortly after that my brother and I went to Rhode Island, and we found them using hens to rear chicks. They put the hen in a coop and put the water where she could not get any, claiming that if she got any water she would start to lay earlier, but that by giving her mash she was satisfied and would not lay so quickly.

When I came back, we cooped up these hens to see if we could keep them without water, and the minute we tried it they went down in egg production. But the next winter when we tried the same thing, there was practically no difference in the egg production from the hens whether they got water or not. The cold weather seemed to take the place of the water to some extent.

COST OF BUILDINGS.

We took a census of the State. We sent copies of the records we wanted each man to keep so that we could get his egg production and his expenditure. We got him to keep a stock sheet and we put on our own valuation taking the state over. There were 117 men in the Association at that time who sent in reports, and the average was a little better than $10.00 per hen tied up in equipment. That did not include real estate; just buildings, incubators and brooders, trap nests, etc. It left them $10 per hen tied up. We figure a hen is worth $1.00, so that with a $11.00 investment, we must have a net profit of $1.10 or 10 per cent. besides pay for feed and labor to get your money back. We have been trying as hard as we can to get people out of that and to have houses that would cost $1 a hen and to do away with the incubator and brooder. Of course, it cannot be done with the Leghorn, and for that reason they are going into breeding Reds. Another strange thing is that our Reds weigh 1¼ pounds more than our Leghorns, and yet we can feed the Red as cheaply as we can feed the Leghorns; we can keep a four pound Red for the year as cheaply as we can the three pound Leghorn.

Q.—What is the amount per hen tied up in equipment?

A.—$10 per hen.

Q.—How much has Tillinghast got tied up per hen?

A.—Less than 25 cents.

Q.—What did he do with his brooders?

A.—They are mostly gone. He has a cheap brooder that cost him $1.25 to $1.50.

Mr. Gammack's plant is extremely clean. He is really not a grower of poultry. He is more of a dealer. His father was an Episcopal minister who looked after an aristocratic congregation in Hartford, and this boy got raising chickens, and the people bought them. His business began to grow, and they could not get chickens enough to supply the trade, and they had to buy.

He has a long house built up on stilts. He bought packing cases for 25 cents and added to the building. It is one continuous addition. He got an egg here and there and hatched it. They went on for a few years till he got an incubator, and then his chicks got the white diarrhoea and he could not do anything. In the last two or three years, he has been buying most of his stock. His trade is dressed poultry and eggs, although he keeps about 1,000 laying hens and raises annually about 1,000 chicks. He has a demand for good eggs, and has the happy faculty of making everything look good when it comes to him, no matter what it is. He thoroughly understands dressing birds, and he puts them out in fine shape, and he gets the price. I have never known him get less than 40 cents a dozen for eggs. He says he never lost a dollar in bad debts. He is now thirty-five years of age. He has seven acres of land, which is valued at $2,500 by the tax collector. He has about 1,000 birds. He has built a house in which he lives with his mother and father, and he keeps two horses and a couple of rigs. He is now changing his business from a poultry grower into a poultry dealer, i.e., the latter side is growing but the former is not going down. He is making money and is considered one of Connecticut's most prosperous poultry men.

There has been so much talk about co-operative work, I thought it would be a good thing if we could get Mr. Gammack's business into the Connecticut Poultry Association. He found that it was very hard to get men that he could depend upon. They would be a little careless and put some dirty eggs into a package, or they would send him some chickens he could not use. They have a trick, in Connecticut, of giving hens a big feed of mash, five or six hours before they were going to kill her. Most of it has gone from the crop, but it is all in the intestines and Gammack found that class of stuff coming to him, and he either had to attend to it personally or else get out of the business, and now he has only fifteen or twenty people from whom he buys poultry. Down there, as here, it is eggs first, and when the spring comes on and the people want roasters, you cannot get them to kill poultry. They feel that they must have eggs. There is room for a roaster business. Mr. Gammack thinks the people would be willing to pay for the goods. When he dresses the birds, he charges five cents a pound for doing the work. He puts some birds up ready to be fricaseed. He weighs them up alive; he does not weigh them after the feathers have been taken off.

Another man down there who has had a decided success with poultry is Cosgrave. His wife says she used to ache to get out on the earth. She says she felt if she could only get out in the parks and sit down in the grass she would feel fresher. She said she was "drying up" in the city. They moved out on the farm when he was fifty-one; he had never lived in the country. They bought the place with $70. That was all the money they had. Thev agreed to pay $550. The farm included a cow. They landed there at night and they did not know how to milk the cow and had to get a neighbour to do it for them. That night he bought three cows on credit. The man who sold them had fed them as long as he could afford to keep them. There were a few chickens on the farm and from these they got a few eggs. However, he managed to raise $50 to buy chickens and that was his start. He soon sold the cows. He got all the old boards he could find and started building coops. Last year Mr. Cosgrave was a member of the Legislature and chairman of the Agricultural committee. He is now seventy-two or seventy-three, and he is without doubt the leader in agricultural questions in the State of Connecticut. He is a man to whom everybody looks for advice. He owns sixty acres of land, and has a good home. He has educated three grandchildren, and I do not know where there is a more happy couple than Mr. and Mrs. Cosgrave, of Willington, Conn. I think I would be safe in saying he has got $5,000 in the bank and possibly more. He has never retailed a thing in his life, and he told me that he never killed a chicken. His wife kills them when there is any to be killed. He ships everything alive to New York, and he grows as nice broilers as I ever saw. He keeps one or two cows and feeds the chickens the milk. He buys stale cracker crumbs and stale bread by the barrel. He is a great feeder of sprouted oats.

Q.—What does he have to pay for that bread?

A.—I think a cent a pound.

Q.—He has made all you say out of chickens?

A.—Yes, he never had an incubator or brooder.

Q.—Did his poultry ever have white diarrhoea?

A.—Never, he does not know much about sick chickens.

Q.—How many chickens has he got?

A.—Five hundred laying hens. That is all he will keep.

Q.—How many chickens will he raise?

A.—He changes his stock every year, just keeps a few hens for hatching next year. He believes he can grow pullets for seventy cents, and he can sell his hens for a dollar.

Q.—How many eggs does it take to make a chicken with him?

A.—I do not know, but I know it does not take anything like as many as it does with the rest of us. His poultry are kept upon a hill in a low lean-to shanty. He puts a few colony houses out in the spring. He believes in letting them have range, and bring them up again in the fall.

We have one other man that I think we should mention. He is a lawyer and real estate man, and he keeps chickens to sell the real estate. He will buy a corner lot in New Haven, and cut down the weeds and clean it up and put a chicken coop in and lock them up and let them run out on the lot. His idea is to improve the lot by the chickens, and incidentally to advertise. He is a breeder of Light Bramahs. He told me that chickens have been the best paying investment he has ever had. I think he would be a man well worth bringing here. His name is Geo. V. Smith. He handles poultry as a by-product, and just there is one of the big things that helps out our small poultrymen in Connecticut. I advise the farmer not to work for the hens, but to make the hens work for him. We do not pay enough attention to the by-product. He puts land plaster on the dropping and hauls them out and spreads them in the furrow after he has plowed the land, and puts his strawberry plants in the same furrow, and he gets magnificient crops. I could name many other successful poultry men, among them two leading manufacturers both good business men, and they are making big money. There are fanciers down there who are also making money. The few that are left in the fancy business are having their stock hatched and raised by farmers.

Q.—Tell us about that woman who crate-fattens her broilers.

There is a woman down there who puts birds up for ten days just before they are ready for the market as broilers. She keeps them on their range and then brings them in and crate feeds them for ten days.

Q.—Do you think the climate in Canada is any detriment to egg production?

A.—I think we can get more eggs in winter than you can. I do not think there is any doubt about that.

Q.—How about the twelve months' production?

A.—I can get more eggs when they bring high prices than you can, I am not prepared to say that the winter egg is a profitable egg. Mr. Tillinghast gets no eggs in winter, and he does not want them. He could not get them with his system. I think your yearly production would be as large as ours. I think the cold weather helps you.

Q.—You told me of an experiment that you made with hens that were brooding and others that you let set and bring out a brood?

A.—Yes, hens that we let set and hatch broods, quite often laid more eggs during the year than did the hens that we broke up. Not only that, but the next year we got more eggs from the hens that we permitted to set, and they hatched better and gave stronger chickens than did the hens that we broke up. It seems that the natural rest the hen got did them a world of good. We don't let them rear the chickens. They were really brooding about four weeks. The other hens we simply put out in a field for a day or two.

Q.—You made some experiment giving hens cold water and warm water?

A.—We fed snow to the hens one winter and everybody said we were cruel, and so the next year we tested it and we gave to one pen cold water and to another pen warm water and to a third snow, and there was very little difference in the egg production or the vitality of the chickens that were hatched from the hens that had cold water or the hens that had snow, but there was an enormous drop in the vitality of the hens that had warm water. And there was a larger death rate among the chicks. That was only one year's work, and we did not get a chance to repeat it.

Q.—Does it make any difference whether you give them cold water or snow?

A.—No; the only difference is that we do not have any freezing of the wattles where they get snow. I would never go after water where I could get snow.

THE CHAIRMAN: We have had a very practical address from Mr. Graham. One or two points interested me particularly. One was the question of the dropping board. I have come to just about the same conclusion as he has. I have a combination of a brooding house and a place to keep surplus stock. In the fall of the year, I convert it into pens. I have dropping boards in that house hinged so that when I want to convert it into a coop the dropping board is put back out of the way. This winter I hinged up one of the dropping boards in one of the houses, and I continually go to the house to see how bad it is getting. I have not cleaned it out for a month, and it is not looking any dirtier to-day than the day they started to use it. Of course the birds simply cover up the droppings by scratching on the floor.

The CHAIRMAN: A great many people learn a great deal more by what they see than by what they hear. They will believe their eyes when they won't believe their ears, and Mr. Graham is very kindly going to prove to us through our eyes what he attempted to do through our ears. He is going to give us an illustrated address and speak to us on his practical work.

ILLUSTRATED ADDRESS

BY C. K. GRAHAM, HAMPTON, VA.

Besides bringing with me slides showing many types of poultry houses that were mentioned in this afternoon's talk, I have also several views of the Hampton Normal and Agricultural Institute, Hampton, Virginia, where I now have charge of the Agricultural Department. This institution is often mentioned as the one which educated or trained Booker T. Washington, of Tuskegee, but I think it is unfair to the institution to say he is the only great man they have ever turned out, although there is no doubt he is one of the greatest if not *the* greatest.

We have at the institution at this time about 1,300 students, starting with the kindergarten and going as high as two years of your college work. The school is divided into two parts,—a day school or what is known as the Whittier School, which takes the students from the kindergarten up through the ordinary grammar school, and also furnishes students for our normal school training. The Institute proper has an attendance of about 800—500 boys and 300 girls—all boarders. I often wonder what would happen if we undertook to make the students at such a College as yours work as long hours, and keep them as busy, as we do the boys and girls at Hampton. For example, they are called at 5.30 in the morning, have breakfast at 6, are obliged to have their beds made and rooms cleaned and get to the classroom by 6:30 where they are kept until 7:30. They then have a half hour in which to change their clothes and get ready for work, for at Hampton every boy and girl works. Our method is "Learning by doing."

The Agricultural and Trade School students work from 8 until 5 in the afternoon with the exception of two hours in the middle of the day when some of them have lectures relative to the work they have had during the day. For instance, the boys working in the barn have an hour a day with the dairyman; those working on the farm have an hour a day in agronomy, but these boys are transferred at certain periods from one branch of agriculture to another. The term is three years with no vacations during the thirty-two months they are with us so far as work is concerned. Of course, we have no classes during the hot months.

All the boys and girls have from 5 until 6 o'clock to themselves; i.e., any subjects taken up during that hour are purely elective. This includes band practice, choir practice and athletics. At 6 o'clock they have supper and from the dining hall march into chapel for prayers. They then get about ten minutes' rest between prayers and night school which begins at 7 o'clock and lasts until 9. Every student is required to attend night school. Fearing that the boys may get a little dull from lack of work we give them calisthenics two nights a week from 9 until 9.30 under electric lights, and everybody is in bed at 9.45.

I simply mention this so that when you hear a boy at the Ontario College complaining about being over-worked I think it would be well for you to think of Hampton before saying very much.

What seems strange about this is that we very seldom have a student break down. The regular habits and steady work seems to be the reason why every boy goes out a stronger man than when he came into the school. They have the best of care, everything is kept as clean as possible, and they are under the supervision of resident physicians.

Mr. Graham then exhibited a number of excellent lantern slides of Hampton work, after which he exhibited views and discussed the leading types of poultry houses of the South.

Q.—That building for a city lot, what is it constructed of?

A.—We cover the boards with Paroid.

Q.—Would that do in this country?

A.—Yes, I think it would, you could have curtains to drop down in the winter.

Q.—What size is that building?

A.—6½ by 16 feet.

Q.—Will you give us your best idea for a poultry house for Canada?

A.—If I were going into business up here I would build a house similar to Tillinghast's; just a colony house, 8 by 16 feet facing the south 4 feet sides and a peak roof.

Q.—Divided in the middle?

A.—No division in it; no scratching shed.

Q.—No protection of the roosting house?

A.—No.

Q.—How many birds would you keep in that house?

A.—We keep only thirty, we put no litter in this house; many keep as high as fifty.

Q.—How do you like a house where the birds roost up high, similar to the Tollman house?

A.—I do not like them.

Q.—Would you put scratching litter in that house in this country?

A.—I think I would.

Q.—Cannot you have these houses so that you can move them?

A.—Yes, we move ours, we use a yoke of oxen and a stone-boat, or what the Yankee calls a drag.

Q.—In using that house, you would not go in for winter egg production?

A.—No, I am not prepared to say winter egg production is the most profitable.

Q.—How many birds would you put on an acre of good land?

A.—You can put 200. I think if the farmers would run 200 hens to an acre through the Brighton and Colborne section it would be a good thing for the fruit growers.

Q.—Would that be as good as hogs?

A.—I do not know anything about hogs.

Q.—Would you use incubators?

A.—I think you will have to.

Q.—How do you operate them: do you use incubators?

A.—We use incubators, and we use brooders, but to counteract the harm we get from that incubator and brooder, we give them abundance of free range. If I were going to hire a person for office work, and I wanted lots of hard work, I would take that man or girl from the country every time. I would take a farmer's son or daughter, because I know they can stand more hard work and work longer hours, and do it with more pleasure than a city boy or girl. Look at the leaders in the financial world.

Q.—Do you think a boy or girl from the country will do more work than a boy or girl from the city?

A.—Yes, I think they will. With poultry we get a new generation every year. In ten years with poultry we accomplish what it would take two or three centuries to accomplish with human beings. That is as good a reason as we can give for a lot of people going into the poultry business and in about five years going "up in the air," for they have got where we might get with a nation in a century and a half.

ADDRESS.

By G. A. Putnam, Toronto.

I am glad to be with you this morning, and trust that we may be able to get some profit from a consideration of the work of Farmers' Institutes. The work of this organization in the first years of its existence was largely done by Agricultural College men, and only one or two meetings were held in each of the counties each year. The result was very large meetings. Subjects of interest to the general farmer were considered and the people looked for and were furnished with entertainment as well. The day of entertaining has largely passed, and we try now to make even the night meetings instructive rather than a source of amusement. The time came, as the Institutes expanded, when it was impossible to get College men to attend nearly all the meetings. Formerly there was a long vacation allowed at the College extending from about the 15th of December to the 20th of January, in order that the members of the staff might give instruction along agricultural lines at the Institute meetings. But that was found impracticable in a few years, and we had to rely upon the farmers who were following practical work throughout the year upon their own farms to do the lecturing at the institutes.

Sometimes I think it might be well to postpone further experimental work at the College and devote all our energies throughout the country to giving the people the benefit of the information which we already have. If we could only get the average farmer to follow the approved methods which we know to be sound we would have accomplished a great work. If we could only induce the poultrymen, the fruitmen, the dairymen, as well as the men who are following mixed farming to introduce those methods which have the approval of all successful farmers, we would, I believe, have done the greatest service to the farmers of Ontario.

For the first few years the general Institute work embraced all sorts of subjects bearing upon farming, and their number as you know is great. That is true to-day also, so far as the great majority of the work is concerned, but the work is fast developing along the line of special Institutes. We have our special fruit Institute meetings, lasting two or three days in one centre, and a definite programme for every hour from say 9 to 4 or 5 o'clock, is announced, with an evening session on one day. We adhere to the one subject and thresh it out to a conclusion. The fruit men go to the meeting knowing just what they will get in the morning and what they will be given in the afternoon, and the whole day is spent in a profitable way. At the end of two or three days they go away realizing that they have received something of real benefit. They have definite information upon lines of fruit growing of special value to the locality, and are inspired and encouraged and take a new interest in their vocation.

The same thing is true of instruction in the judging of live-stock, and it is extending to poultry lines as well. We have held a few poultry Institutes somewhat similar to the one you are now holding here, but not so extensive. We held a few last winter in Morrisburg, Perth, Leamington and other places. In addition to that we are having special poultry meetings in connection with the poultry shows. As you know, we have a great many local poultry associations throughout the Province. These associations are now required to have lectures in connection with their shows, in order to secure the Government grant. We send out speakers such as Mr. L. H. Baldwin, Miss M. Yates, Prof. Graham and Mr. Geo. Robertson. We think this work is destined to grow extensively.

The officers of the Farmers' Institutes throughout the Province do not often ask for speakers upon poultry topics for the regular Institute meetings. We believe this is a mistake on the part of farmers. The average farmer can make as much profit out of his hens for the money invested and the work involved as in any other line of farming, and it is, therefore, a topic which should be taken up at the regular Institutes. It is *profit* we are after, whether we are working in the dairy, with the poultry or along some other line.

In taking a canvass of Eastern Ontario we were surprised to find that the average production of the cows was only 2,700 pounds during the factory season. This represents a return of about twenty-seven dollars in a good year such as 1908. I do not think you will find many farmers who will admit that they can keep a cow throughout the year for less than $25. $2 profit during the factory season and the little additional profit after the factory season is over or before it begins in the spring, is not enough; and I venture to say that many dairymen are not making as much profit out of their cows as they would make out of an average flock of hens. I think it can be shown that a farmer can keep from sixty to seventy, or it may be a hundred hens at a considerable profit. I do not know that it is wise upon this occasion to speak of the poultrymen who is making a specialty of poultry. We cannot point to many men who have gone into poultry raising as a specialty who have made a success of it. I believe you have to look to the average farmer for profit in the poultry business; and by average farmer I mean one who does not keep more than 100 hens on the average farm. Up to that number, I believe a farmer can make very substantial profit because there is a great read of refuse on the farm that can best be used for feeding poultry. Then the son, daughter, or wife upon the farm generally takes pride and enjoyment out of looking after the poultry, especially if their receipts are not confiscated by the head of the family. They will never notice the extra labor that is involved, and you know what a little additional cash means on the farm. A very large percentage of the income from poultry on the farm can be put down as profit, and I only wish we could induce all our farmers to keep a limited number of poultry and follow more up-to-date and uniform methods.

May I draw a comparison between poultry raising and grain growing. I believe if the average farmer would take ten acres of wheat or oats or any other general farm crop and reckon the interest on the investment, the cost of seed, the labor involved, the plowing, harrowing, sowing, harvesting, threshing, marketing, etc., and compare the results with the net returns from a flock of hens, he would find that there is much more profit in the hens. He would have greater net returns from the hens than he would from his field of grain.

Up in South Simcoe they are following the old method of summer fallowing. One of my Institute workers, Mr. John Campbell of Woodville, when through that section in January last, took the opportunity of making a very careful estimate of the cost of producing ten acres of grain, and he proved conclusively to the men of the locality that if they were allowed a reasonable wage for the labour involved, paid the market price for their seed and allowed a rental for the land, they were actually losing money in producing wheat. We could hardly induce one of these farmers to put the same energy, time, or care into looking after poultry, still if he would do it he would be a substantial gainer. Mr. Adam Armstrong, one of the many good farmers near Fergus, related to Mr. Campbell last week that he bought a bird from one of his neighbours, used a little intelligence in the feeding, took it to the Ottawa show, and sold it along with the rest of the birds he had on exhibition at twenty-five cents a pound. The hotel he sold it to was very glad to get the poultry at that price and were prepared to buy large quantities of superior fowl at the same price. The fowl had been well fed and nicely dressed.

Q.—What kind of a bird was it?

A.—Plymouth Rock. That shows vou what can be done upon the average farm by using a little intelligence and care.

May I repeat that I believe it would be time well spent to devote a portion of the time of the Institute meetings in advocating poultry and egg production, but we cannot look for any marked increase in the attention to be given to poultry matters at regular institute meetings at the present time. It would be well to make an effort to induce farmers in different sections to take up the poultry question, and it will be my aim to pay a little more attention to this subject in the general Institute work, and to make an effort to get certain sections of the country to go into poultry raising more extensively and upon a uniform basis. The fathers or mothers cannot do better by their sons and daughters than to induce them to take up poultry keeping and to give them some assistance in making a start. What better training could a boy have than to be given the responsibility of some branch of the farm, and what is more interesting to him, or what could he handle better, than a flock of chickens? As a training for the boy in business methods, industry, and attention to details, it is a subject which should be given greater prominence.

We arrange our poultry Institutes the same as you do here. Definite announcements are made for certain hours of the day, and we send good speakers to deal with the subjects announced, to induce those in attendance to ask questions. The speakers are supposed to inquire into local conditions, and to study the interests of the people as far as possible. In all Institute work you must know what the people in the locality are doing in the line under consideration, and the speakers must size up the situation and decide for themselves what will be of greatest value to the people.

Several speakers have attended poultry shows for the purpose of giving lectures. Poultrymen are very enthusiastic exhibitors. They are so careful of their birds that they do not like to leave them, to listen to lecturers. In some localities, however, we have succeeded in getting large audiences to attend the lectures upon poultry topics at the time the show is held. We believe, however, that better results would follow if meetings were held at some other time.

In the Women's Institute we are doing good work along poultry lines. Lecturers upon poultry topics are often asked for at Women's Institute meetings. The women are taking an intelligent interest in this subject and we are hearing from time to time of the good results of the work.

Some acquaintances of mine living eight or ten miles from the city of Toronto, have, for the last two or three years been co-operating in marketing poultry, and other farm produce in the city of Toronto. They sell most of their product direct to a good grocer, and get from three to four cents a dozen more than the average man for their eggs. They stamp their eggs and bring them in regularly, with the result that each of these three brothers require to make a trip only once for every three times that their eggs are marketed. They have been unable to induce their neighbors to co-operate. The larger the number who co-operate and the greater the quantity of high class product we can place on the market from the one locality, the more certain we are to establish a profitable market.

The day is past when the farmer says to himself, "I have something good and I will keep it to myself. I won't let John Jones know that I have the best seed grain or the best poultry, or the best producing cow." Farmers are beginning to realize that it is to their interests to see that their neighbors are producing as good stuff as they are. We must look to greater co-operation along poultry as well as other lines; and in order that co-operation may be successful we must have some sort of local organization. We can with profit deal with the subject of local organizations for a few minutes this morning. You may call these organizations "Farmers' Institute Clubs" or by some other name; I care not what you call them, so long as the farmers of the locality will come together and discuss their local conditions applying the information which may be gathered in such large quantities from the reports and bulletins from the College, other Departmental reports, the Agricultural Press, and often through the local Press. If the farmers would come together for the discussion of those lines of agriculture which are of importance in the locality, make a local application of the knowledge obtainable, and have free discussions, it would be of inestimable value to them.

A year ago last June I met with the Specialists in Agriculture who were appointed at that time to take charge of the Agricultural educational work in high schools and investigations along agricultural lines in different sections of the Province. I said to them: "It appears to me that if you will make an effort to induce the farmers in your territory to form local clubs for the purpose of coming together occasionally and discussing local conditions you will have a means whereby you can work not with the individual but with a body of men." They did not take it up very enthusiastically at first, but none of us were sanguine as to the wisdom of this line of procedure at that time. Some of them have recently devoted a good deal of attention to this line of work. Mr. Hart of Waterloo County is now spending considerable of his time in visiting the clubs already formed and in organizing additional clubs. Mr. Winslow of Prince Edward County has twelve local clubs organized. I asked him what he thought of these local clubs as a means of education. "Why!" he said, "I do not think there is anything better; it is a hundred per cent. better than the ordinary Farmers' Institute meetings." Through these local clubs the farmers come together and discuss local conditions, and exchange experiences from time to time. Some of them hold meetings every two or three weeks, and in some localities even once a week. Mr. Winslow reports that in Prince Edward you cannot announce a club meeting but you will have visitors from adjoining clubs to see if they cannot get something to take back to their own organizations. They are considering in some of the clubs the matter of co-operating in the purchase of supplies, such as spraying materials, seeds, implements and other things which can be bought in quantity to advantage.

In the establishment of these local clubs we get the farmers of the locality to come together and discuss the advisability of forming a club, and if thought favorably of, organization is at once proceeded with. It is essential that you get some man who is a moving spirit in the locality, to take an active interest in it. You need men who will devote some time and thought to the work before you can hope to make it successful. It is of great importance that you get the right men for officers. If there is one thing I try to impress upon Institute lecturers, it is that they use discretion in getting good officers for these clubs, for the very life of the organization will depend largely upon this.

The assistance which the department renders to these clubs is dependent upon two or three things; they must hold five meetings throughout the year, and must have a membership of at least twenty-five members, twelve of whom must also belong to the riding Farmers' Institute, before they can look for a special speaker from the Department. It is only a matter of twenty-five cents to join the Farmers' Institute, and if a farmer is not prepared to pay this amount to belong to the Institute and receive reports issued by the Department of Agriculture, he is not very deeply interested in his business. The fee for the local club is set by the members and is in accordance with the needs of the organization.

I might venture to say just a few words along practical poultry lines. Poultrymen will never attain that success and get the price which they should get, until they stamp their eggs, grade them, and properly prepare their poultry for the market. You can only do that when you have fairly large quantities, and you can only get large quantities when you have a number of men to co-operate. I think we have just begun to realize what can be done along co-operative lines, and it is to co-operation that all classes of farmers must look for success.

We know what has been done in fruit lines by intelligent co-operation. I have an instance in mind of a farmer in Western Ontario who was thinking seriously of cutting down his orchard. It was not worth more than $50 or $75 a year to him, and he had concluded that he would prefer to have the land for other purposes. A neighbor farmer said, "I will rent the orchard from you for four or five years, what do you want for it?" The reply was, "I will take $50 for the first year and $75 for each of the next three years, and if you do not make any money on it you need not pay me?" The man said, "I will pay you if I decide to rent the orchard." He rented the orchard, and the first year he cleared several hundred dollars, as a result of spraying and intelligent cultivation. The next year, after all the expenses were paid, he cleared $800. It seems like a fairy tale that he would clear $800 from an orchard for which he paid a rental of $75 a year, but he has the figures to show. This is one of our leading co-operative men, and it was by selling through the local co-operative association and by getting his spraying material at a cheap rate that he was able to carry on the work at the minimum cost. I trust that the poultrymen will form more local organizations.

We have issued a little booklet on the organization of Farmers' Institute Clubs and these are free to those who ask for them. It makes no difference whether you take up poultry subjects or fruit subjects, the club is the place where these things can be taken up to advantage. In these local clubs we have a force which is going to be far greater than we had thought when we first advocated their establishment. It was from noticing the splendid work of the Women's Institutes that we were induced to recommend similar organizations among the farmers. In the Women's Institute we have the women coming back from month to month to their meetings for the discussion of anything and everything that will make for the betterment of home conditions, and in the Farmers' Clubs we want to discuss anything and everything which will mean greater profit to the farmer. We must not, however, lose sight of the fact that profit is not the only object in view. The club organization can be utilized for literary, musical and social advancement.

Mr. McGrew: This utility question is a very peculiar one. Generally you will find the man who points out the utility bird, points out the poorest bird in the show.

Prof. Graham: Did you ever see the best bird in the New York Show with a crooked breast bone?

Mr. McGrew: Yes; crooked breast bones are made by roosts.

Prof. Graham: Did you ever have a bird that would breed fifty per cent. crooked breast bones?

A.—No; I never had a bird that bred ten per cent. with crooked breast bone.

The Chairman: I am quite sure this educational feature is an admirable one and will do a considerable amount of good. Professor Zavitz gave a lecture at Lindsay on seed grain, and he was able to demonstrate to the farmers that by giving up the growing of one particular oat and sowing another, it would make an increase of one hundred and ten thousand dollars in one year alone, and that is a big gain in one locality.

The next speaker on the program is Mr. Bennett, a young man who has shown some very good parts as a poultryman, and his experience with poultry, I am quite sure, will be interesting and profitable.

RAISING CHICKENS.

By Wilbur Bennett.

When I first started to take an interest in poultry, there were just a few Minorcas on our farm, so that I had to get some Barred Rock hens to do my hatching, as I did not have an incubator at first.

Well, that year I reared only about sixty chickens, practically all Minorcas, and as they were not hatched before the 15th of May or so, they did not make winter layers. That first year we built a poultry house, 24 by 15 which did not prove very satisfactory for its intended purpose. Built too close and warm, it was nearly impossible to ventilate it properly to avoid moisture, and I have since turned it into a brooder house.

The next year, 1905, we purchased a 220 egg Chatham machine and raised some 300 chicks, but as I was an amateur in the marketing I did not make anything extra with them, but got some 75 good pullet Barred Rocks, which were the start of my present flock.

In January of 1906, I attended the Poultry Short Course at O.A.C., and right here I would advise anyone in a position similar to mine to do likewise. Besides teaching one the practical theory of the business, it tends to make one take more interest and have more respect for it.

In the spring of 1906, fresh from the Poultry School, I hatched some 600 chicks with my "Chatham" helped out with some broody hens. I don't think I have ever had quite as good luck since, as I had that year. The eggs were fertile and the chickens lived, raised in home-made brooders. We built a house 60 ft. by 12 ft. to accommodate the pullets. The house was built on the fresh air idea, straw ceiling, cotton front, so with the old house I was able to carry over 220 pullets as winter layers. We dressed the cockerels which had been crate fattened and shipped them to Montreal. They little better than covered the cost of rearing themselves and the pullets. I kept pretty close account that vear from the fall of 1906 to October, 1907, and can give fairly close figures. I sold all the flock but 100 in June, and taking the average of the entire flock it was about 130 eggs, most of which were laid before June. I sold the eggs to Walter Paul, of Montreal, and the fowl to a Hebrew butcher of the same place. The eggs netted 24 cents a dozen and the fowl about $1.50 per pair at 13¼ cents, alive, f.o.b. Figuring the entire proceeds to June and that they had all been sold, we have:

Fowl sold for	$ 75	Cost of feed	$1 00
90 Eggs at 28c. per dozen	2 10	Profit	$1 85
	$2 85		

I can always figure that the cockerels sold will easily defray the cost of bringing themselves and pullets to the time of killing and laying.

In the summer of 1907, we added to our plant a 250 egg Prairie State incubator and six "Universal Hovers," with 6 by 8 coops to accommodate them; also another house, 87 by 12 similar to the first one to hold 200 hens, and also feed room. I reared some 1,200 chicks, so that in the winter of 1907-8 we had some 350 hens. But as they were not all hatched quite as early we did not get quite as large a yield in the winter months as before, and the price of grain also becoming a factor did not make so high an average profit as in 1907—about $1.25 per head that year.

Last spring we added another 200 egg "Chatham," also a 360 "Model" and 12 more "Universal Hovers" to our plant, and reared about 1,200 more chickens to maturity. They did not continue hatching as late as the summer before. Selling the produce to the same men the price of eggs and chickens was about the same, chickens 10 to 12 cents per pound, live weight, f.o.b.; also selling quite a number of eggs for hatching, especially of Buff Orpingtons, of which I had about 50, which helped to average things up.

My manner of feeding is along the lines which were followed by Prof. Gowell at Maine State. Dry mash before the fowl, and grain, such as corn or wheat, in litter. I never yet have fed beef scrap. We have a bone cutter run by a tread power, by which we also crack wheat or corn besides cutting wood, etc. We try to secure about 100 pounds of green bone a week, and feed to the fowl each day about ½ ounce apiece. They also have the other accessories, such as mangels, oyster shell, etc. The chickens are reared along the same lines, dry mash placed before them three or four times a day at first, with chick feed or cracked wheat in the cut straw to keep them going; also milk and water to drink with mangels, etc.

We have used the "Universal Hovers" exclusively to brood; they are placed in the brooder house at first, but later in colony coops where they are used till heat is no longer required.

I would like to know the opinion of those present as to my method of selling the cockerels. One is generally told to dress them to get over the shrinkage, but one cannot sell to Hebrews and kill them. It costs for expressage from Peterboro to Montreal about $1.50 per 100 pounds, that is with weight of coop, etc; but I sell f.o.b., so how would 12c figure out with the dressed fowl prices.

Mr. McGrew: The cockerels paid for themselves and the pullets as well?

A.—Yes.

Q.—What bone cutter have you got?

A.—A small sized "Humphrey." I pay ½ cent a pound for the bone.

Q.—How much land have you got on the farm?

A.—One hundred acres.

Q.—You made $450 out of 300 hens?

A.—Yes.

How much did you make out of the rest of the farm?

A.—About the same.

Q.—You never had any trouble with your chickens, and you raised 75 per cent.?

A.—Yes. I had better luck with the early ones than the later ones.

Mr. John Ridge-Terry: Don't you think you get tired towards the last, and you do not give them so much attention?

A.—That might be.

Q.—Do you get all of these chickens out before you put in your crop?

A.—Yes. I will get them all out this year before the fifteenth of April. I do all the farm work myself.

Q.—Do you look after these chickens alone?

A.—Yes; my father is a carpenter and he helps me in putting up the buildings.

Q.—How many hours a day do you spend at farm work?

A.—I do not spend over three hours a day with the chickens.

Q.—You do not spend any more time with the chickens than with the cows?

A.—I do not spend much time with the cows. I take no interest in them. The only things on the farm I take any interest in is the chickens and the garden.

Q.—How many eggs do they lay?

A.—I get from twenty to thirty in the winter time from fifty hens. I do not think they average over twenty eggs a day for the entire month. I have always had trouble with my Rocks, as they do not mature early enough. I only keep Buff Orpingtons and Rocks. I had fifty Orpingtons and three hundred Rocks, and I had more profit from the fifty than from the three hundred Rocks. I had an average of one hundred and thirty eggs from each bird.

Q.—Do you feed green cut bone?

A.—Yes. All the time except in warm weather; in the summer I feed ⅓ ounce a day. I feed it just as I get it fresh.

Q.—How do you spread it around?

A.—Just in a long trough.

Q.—Do the greedy ones get the most?

A.—Sometimes we get a hen that has a little trouble with it.

Q.—Do you put in five pounds for twenty hens?

A.—No; I would not. I think you would have liver trouble if you did. Sometimes when they get too much, their combs become black.

Q.—What is the highest price you have got for a dozen eggs?

A.—Fifty cents, from the first of December to about the first week in January. The price always drops with me in January, and I only get thirty-five cents for them.

Q.—You sell them wholesale

A.—Yes; to a grocer. I put them up in thirty dozen crates.

Q.—What will your young chickens average in weight?

A.—Four or five pounds apiece at five months old.

Q.—It cost you to raise a pullet to laying time, thirty-five cents?

A.—Yes.

Q.—Are you not able to get your Rocks ready for the market quicker than the Orpingtons?

A.—They fill out better.

Q.—How much land have you got where you raise the chickens?

A.—Four or five acres of an orchard.

Q.—Do you cultivate it?

A.—This year I planted a new orchard on two acres and I raised my chickens there in the corn field.

Q.—I understood you to say that you made as much profit on your chickens as you did from the rest of the farm?

A.—Yes; we did.

Q.—In addition to that your investment, as far as the poultry is concerned, is not more than one-tenth of the rest of the farm?

A.—I think not more than one hundred and fifty hens in the poultry plant.

Q.—You have at the present time seven hundred dollars in poultry and incubators?

A.—Yes; fencing and everything combined.

Q.—In addition to that you spend quite a bit of time helping with the farm work?

A.—Yes.

Q.—Your poultry business is far more profitable than anything else?

A.—Yes; I think I can take care of a thousand laying hens.

Q.—What kind of a homemade brooder have you?

A.—A "Universal Hover" brooder.

Q.—Do you buy the parts?

A.—They come complete ready to fit any brooder.

Q.—Do you use colony houses?

A.—Yes.

Q.—You spread this out over the orchard?

A.—Yes.

Q.—How far apart do you put the colony houses?

A.—100 feet.

Q.—What time in the year do you hatch your pullets?

A.—I like to have them all out between the fifteenth of March and the fifteenth of April. I sell cockerels the first week in June.

Q.—How old are they when you sell them?

A.—Twelve weeks.

Q.—How much do they weigh?

A.—I have had them weigh two pounds in twelve weeks.

Q.—What do you get for them?

A.—I get thirty cents a pound from the Canadian Produce Co.

Q.—Do you sell them alive?

A.—Yes.

Q.—Have you floors in your colony houses?

A.—Yes; except some three by six coops.

Q.—Did you ever try cement floor?

A.—No; I am not troubled with anything but hawks.

Q.—Do you send your eggs to Montreal every day or just twice a week?

A.—Once a week.

Q.—You have no summer eggs?

A.—I have quite a lot the first of July and after that nothing to amount to anything.

Q.—How many birds have you lost of these one hundred pullets in the last two months?

A.—Of the Orpingtons I have not lost any.

Q.—And the Rocks?

A.—In the Rocks I suppose I have lost eight or ten in the last two months.

Q.—What size building have you where you keep a hundred Rock pullets?

A.—Twelve to forty in two pens; each pen twelve by twenty.

Q.—Do you have dropping boards in your houses?

A.—No.

Q.—How often do you clean the hen house out?

A.—Every three weeks I drive up in front of the hen houses, take out and spread it right on the farm.

Q.—Do you haul your manure direct on the farm from the stable?

A.—No.

Q.—How many cockerels do you keep in each pen with fifty pullets?

A.—Four.

Q.—Do you find they fight?

A.—Sometimes; but not if they have been raised together.

Q.—Don't you think there is one or two too many?

A.—No; I do not think so.

Q.—What do you use for green food?

A.—Mangels and sugar beets this year.

Q.—Have you ever compared the sugar beet with the mangel?

A.—No, I have not, but I believe they like the mangels best.

Q.—Do you feed the milk skimmed or sweet?

A.—Skimmed milk, sweet. I feed it sour when I am fattening.

Q.—What ration do you use for fattening?

A.—About half oats and the other parts barley and buckwheat.

Q.—When you feed them three weeks what gain do you make?

A.—About a pound and a half or two pounds.

Q.—Are they troubled with lice?

A.—Yes; I spray with zenoleum.

Q.—Do you white-wash your hen houses?

A.—Yes; I do that in June once a year.

Q.—Are they troubled with influenza in the fall of the year?

A.—Yes; they were trouble with it a year ago.

Q.—What did you do?

A.—Gave them a dose of salts, and they seemed to get over it.

Q.—Do you think zenoleum will kill red lice?

A.—Yes; if you put enough on.

Q.—What quantity of salts do you give to one hundred hens?

A.—About a handful in water.

Q.—What do you mean by a handful?

A.—A couple of tablespoonsful.

Q.—Do you use table salt in your mash?

A.—No.

The Chairman: I am sure we are very much obliged to Mr. Bennett for the information he has given us. Personal experience of that kind gives us more hope for the poultry industry.

POULTRY RAISING.

By L. A. Martin.

I took a short course in poultry in 1905, and I have attended the College the last two winters, and I feel that I have been well repaid for my trouble. I think my experience in taking the poultry course has been a good investment to me and it was taking that short course that induced me to come here to the longer course.

I think the poultry business in this country lies more with the average farmer than with the men who are following the business as a special one. Greater profits are realized by farmers keeping from fifty to two hundred hens on an ordinary one hundred acre farm. There are many things which help to make poultry raising, as part of the farm work, more successful than as a special business. One of the speakers mentioned yesterday that certain parts of Connecticut were not profitable for the poultry business on account of the land being too expensive. On some of our most expensive land it has been proved that poultry can be managed in connection with general or special farming to good advantage, and double returns realized from the same area of land. Poultry can be carried on in connection with horticulture, dairying, etc.

The first and most important part of the poultry business, in my estimation, is the stock. The kind of stock for a farmer to keep, depends on his aim and the line of business he intends to follow. I find that the general purpose fowl gives the best satisfaction.

I intend to give some of my own experience, but I wish you to understand that I do not think my experience is the best; because I find that ideas change very rapidly, especially in connection with poultry business. I find the Barred Rocks very hard to beat as a general purpose breed. The strain, I think, is more important than the breed. I have been giving little or no attention to color, I have been selecting for the purpose of improving the vigor of the type and the egg laying qualities.

Ten years ago I started a little poultry flock of ten chickens that were handed over to me. I was quite young then, and I felt proud of this care that was given to me, I think that is the reason I have developed a special interest in poultry. We bought ten pure-bred Barred Rocks at that time, and since then we have been buying as good males as we could get in the locality at ordinary prices every year.

I have no trap nests, because it is a question in my mind whether it is profitable for the ordinary farmer to use them. They require considerable time, and I think anybody with an ordinary knowledge of poultry can have a fair idea of the most profitable hens.

Q.—What do you mean by ordinary knowledge?

A.—In the winter time if you go into the hen house and see one or two hens off in a corner with pale combs, and they don't care whether they come to get anything to eat or not, and these hens are generally of a fluffy nature, then you can say, "That hen is not good; I don't want her." That is the kind of hen that doesn't look like money. I do not mean to say you can tell them as well as you would by using trap nests.

Q.—Did you ever have a hen that was broad across the forehead that was a good layer

A.—I have not noticed that.

Q.—What do you call an ordinary price for a cockerel?

A.—One that I can get for $2. Where the business is not developed in a fancy way you might get one for $2 that you would have to pay three times that price for to Mr. Graham or some fancier. Most of the ordinary farmers do not know the value of a bird.

Next I come to the matter of housing. We had two old houses, 16 by 10, made out of ordinary single boards with battens over the cracks and with a mud floor. Part of the floor is raised up, on which I keep the feed-hopper and water, etc., and the rest of it is used as a scratch house.

Q.—What do these houses cost you?

A.—I do not think two would be worth $25.

Q.—How many birds did you keep in these houses?

A.—From twenty to twenty-five. In the summer time I can keep more, because they are out all day. I do not think it matters how many hens are in the houses as long as they have plenty of room to roost.

Q.—Do they run around the barnyard?

A.—In the summer time I have about 1/5 of an acre around these houses and I keep it cultivated, and at times when it is not suitable for the hens to run out, owing to the crops, they are confined in this yard. I cultivated it after each rain, and for shade I planted plum trees. They are small now and I have a couple of old doors and the hens stand under them. Around the outside of this yard I planted sunflowers and these grow to a great size, some, some ten feet high and make good shade around the outside of the yard, and it adds to the looks of the place.

With regard to ventilation, in the summer time I get all the fresh air I can without drafts and in the winter time I have one side of the house open. For scratching material I think good cut straw is about the best.

Q.—Do you like that better than uncut straw?

A.—Yes; it is hard for the hens to work around in the long straw. I have dropping boards on the roosts and eight feet above the ordinary scratching floor. I scrape the dropping boards every two days in the summer time. I find by doing that and using a little coal oil I did not have much trouble with lice.

Q.—Do you keep 150 birds in these two houses in the summer time?

A.— Yes. I think the eggs are the main part of the business. We try to make the best we can from the other parts as side lines. I practice the dry methods of feeding with good results. In the summer time I see that the hens get green feed. I have a piece of ground where I sow rape early in the spring. Before the rape come on I feed them cut green clover.

Q.—Do you find any flavor in the eggs after feeding rape?

A.—No; we sell our eggs in St. Catharines, and we have not had any complaints. I have a home-made hopper for feeding dry mash, I like to feed bran, cornmeal and middlings. The only grain I feed is whole wheat. We grow the corn on the farm.

Q.—Do you ever have roup on your place?

A.—I do not think I have. The hens had colds in their eyes and their faces have swollen up, but nothing serious or anything that I thought was contagious.

Q.—Any cancer in the mouth?

A.—No.

Q.—Do you find any difference in egg production when feeding cracked corn and whole corn?

A.—No. In the summer time I have skimmed milk before them all the time; it does not seem to make any difference whether it is sour or sweet.

Q.—Do you wash the dishes that you put the milk in?

A.—No, I do not. I just pour it in on top every morning, unless there is too much sour milk, then I might put it out. I keep the water dishes washed. I keep oyster shells before them all the time. I think if chickens have plenty of oyster shell grit before them, they will not eat the eggs. I have seen eggs laid on the roost and break, and the hens have actually eaten the egg and left the shell. I give them all the mangels they will eat up.

Q.—Do you hang them in the pen or cut them open?

A.—I cut them in two with a shovel, and then I put them on a nail in the wall.

Q.—Would twenty-five birds eat two big mangels?

A.—No. To take the place of the milk I feed them meat in the winter; milk does not give such good results in winter as it does in the summer. In our neighborhood there was a horse that became unprofitable to feed, and I bought the horse for $3. I dressed it as you would ordinary beef and I sold the hide for $3. I had the carcass left, so I hung it in a place where it froze. We have an ordinary old-fashioned brick fire-place in an old shop, and two iron kettles or pots, that hold between two and three bushel each. I cut the carcass up so that it would fit into these kettles and I started to boil it early in the morning and kept boiling until it was nicely done.

Q.—Do you think it is necessary to boil it very long?

A.—It was necessary to boil it until it was done, as the horse was twenty-five years old.

Q.—What about disease in the horse if it was not cooked?

A.—You would run a risk of toxines.

Q.—How many horses did you take to feed 150 hens all winter?

A.—I fed that horse six weeks. Then I got a horse that had the heaves, and I got forty pounds of fat out of the horse. It lasted six weeks. Then I got an old Jersey cow, and fed it to the chickens. I sold the hide from the cow for $6, and had the carcass left. Then a neighbor told me he had a cow about a year old that had just choked to death and I took it. I got that meat practically for nothing. I was very careful to give it to them gradually until they became accustomed to it; after that I gave it to them every day, and then I gave them all they wanted of it.

Q.—How did they lay?

A.—They laid splendidly, and they did not eat much wheat. My father said I was feeding them too much grain, and that I should keep an account of what they were eating, and about the first of July, after the laying period was over, I had $150 above expenses from these 150 hens as my net profit. I showed him these figures, and since that time I have no trouble in using my own judgment in regard to what I want to do in the line of poultry. He is quite convinced that there is money in it if it is managed properly.

Q.—Have you had any difficulty in feeding middlings?

A.—I have never fed very much. I feed middlings, bran and corn meal in a mash. We cannot get good middlings, they look like ground bran. We have a stone grist mill near our place where the farmers get their wheat ground for their bread, because they like it better and we get the middlings and bran back from this stone mill.

Q.—Do you know whether you have much cockle growing in that section?

A.—No, we have no cockle. The wheat we buy comes from Manitoba; high grade flour is made from this wheat and it is good wheat. I have had no experience with weed seeds whatever or anything of that kind.

Hatching Chickens. At first I hatched with hens, and then I bought an incubator and two brooders of the "Cyphers" type, and I have used the incubator ever since. My experience in hatching with an incubator has been about the same for years. I have used it for six years. Last year I thought I could get better results by using zenoleum, but I do not see very much difference. I put in 220 eggs, and I never get more than 130 chickens and never less than eighty. I generally have a good vitality.

Supposing you put 220 eggs under hens, how many chickens would you get?

A.—I have had very good results from hens, but when it comes to hatching 200 or 300 chickens, I think I can get just as many chickens from the incubator as I can from the hens. I prefer the incubator every time. When the hens can run all over the place and select their own nests you have good results, but when you have to move the hens, my experience has not been as satisfactory as I would like to have it.

Q.—Have you had any White Diarrhoea?

A.—I am not sure. One summer I had quite a lot, and the chickens came about the first of July. They were very smart and thrifty, and looked fine for a few days, but later on I lost nearly the whole lot. At the time I knew nothing about White Diarrhoea, and I thought it was due to wrong feeding. It was practically impossible to keep the brooders warm before the first of May last year, and in place of using brooders I set a few hens at the same time as the incubators. I put the chickens with the brooder and hen and I was very much pleased with the result. I only had one hen that gave me trouble, she killed every chick. I think the best way is to put one or two under a hen in the evening, I leave them in the nest for a while, and then I put them up in the ordinary coops. I put the chicks out in the corn field about the first of June. I hopper feed them and give them milk, but no water and no dry mash. They grow fine and run all over a twenty-five acre corn field; and in cultivating the corn the chicken will follow you all over the field.

Q.—How much money have you invested in your outfit?

A.—Not much. The houses are not worth very much; 150 hens are worth fifty cents a piece, and the two incubators and brooders worth about $50.

Q.—How much are you making a year?

A.—I made $140 out of the hens one winter.

Q.—Will the balance of them pay the expenses?

A.—Yes. I calculate that the cockerels pay for raising the pullets. I crate-fatten the late ones, but I did not early ones. I caponized twenty birds that were late. They lived on very little, and grew nicely, and I crate-fed them for the Easter market. I put them in the crates for three weeks. I dry packed them, and their backs looked just like a roll of butter. I sold them to Mr. Wilkins and he sent them to Buffalo. I received twenty-five cents a pound for them with the feathers off.

Q.—How much did they weigh?

A.—One weighed ten and a half pounds; that was a Barred Plymouth Rock. They were hatched in July. Experienced men caponizing, loose 5 per cent. I lost more than that. I see no reason why caponizing cannot be carried on, as I think there is a chance of making good money.

Miss **Yates**: My experience has been very satisfactory, I do not think I lost 3 per cent.

Mr. **Fortier**: Last year I caponized forty-five, and I do not think I lost one. There is no mother on earth better than the capon. I put twenty-two chickens to one capon, and they are the best mothers you can get. They do no permit any chickens or roosters to go near them.

Dr. **Morse**: Using capons as mothers was mentioned by Pliny. The chicken must be introduced to the capon at night, and thereafter you can gradually increase the number, and they are able to take care of a larger number than a hen, and they will fight for the young ones.

Mr. **Martin**: I shipped a few chickens to Montreal in bushel apple boxes. I put ten in a box and sent five boxes to Westgate & Gouse, and I received a little more than I would have received in St. Catharines. I think by working that trade up we will be able to improve prices in our own locality.

HOW TO SUCCEED WITH POULTRY.

By T. F. McGrew, Scranton, Pa.

The well trained man in every line of work is usually the one to whom the greatest amount of success comes in all business ventures. Look about you in any and all directions, study the outcome of every venture, and learn from experience or observation the greatest lessons of the present time; they teach us that success comes as the reward of diligence put forth in an intelligent manner. I have seen a thirty-acre field yield more than three thousand bushels of corn from a single crop; no fertilizer was used, and but little cultivation, as we now understand the term, was given it. During the same year and in the same locality, corn was burned for fuel and potatoes sold at fifteen cents per bushel. At that time, even shiftless methods brought at least partial success, but now such methods assure failure from the very start.

This is not only the day of progression, but it is the day of compulsion as well. One is compelled either to progress or fall behind in each and every walk of life. We have all been told that there is "plenty of room at the top." That was true in the sixteenth century, and it is true to-day in every line of endeavor, and doubly true of poultry culture. In every branch of trade throughout the world the keenest competition exists. You who dwell in this colony of the King must meet at the port of entry on the other side the competition of far off Russia for the egg and poultry trade of your own Motherland. Well may we ponder over the words of the poet, who wrote:

"New times demand new measures and new men;
The world advances, and in time outgrows
The laws that in our fathers' times were best."

Without knowledge and experience we fail. No one can fathom the jungle or sea without the line and compass, nor can any of us master the business of growing poultry at a profit, unless we have the knowledge of what to do and the experience as to how it should be done. Yet there are those who fail to make a success of rearing poultry from no cause other than their own ignorance, carelessness, or indifference to the needs of the fowls.

The statement may be a startling one, yet I am convinced that fully one-third of all the chicks hatched do not receive food enough to grow them to a healthy maturity. Tons of chick food is wasted by the anxious ones during the first few days or weeks of the chicks' existence. It seems to be the general opinion that the young chicks must be disturbed every hour or oftener, to be fed. Unfortunately, this opinion is not continued; in thousands of instances, the partly grown chicks are almost starved to death.

Recent examples of this have come under my observation, one being a case where over three thousand chicks were so poorly fed that they averaged scarcely two pounds each at over four months of age. Investigation proved that the chicks were fed about four bushels of grain per day when they were over four months old; this is about four thousand ounces of grain per day, or one and one-third ounces per day for each chick; during the same week in which we saw the half-starved flock, we saw over four thousand chicks in another locality that were fed more than four times as much per day as the other lot. The profitable prices received for the well-fed stock proved the advantage of good feeding. In order to succeed with poultry, the chicks must be "well hatched," "well fed," "well grown," and "well sold," and to accomplish all this, the parent stock must be perfectly "well," and those who grow the chicks must be "well informed" as to poultry culture.

If I had been asked one year ago to tell this gathering how to rear a thousand or more chicks upon a farm, I would have told it to rear them by artificial means; but if I were myself contemplating such a proposition at this time, I would attempt to hatch and rear the greater part of the chicks with mother hens. The appalling conditions that confront us on every side in the lack of vitality in the producing stock, eggs, and chicks, prompts one to ask loud and strong for the cause of this quick decline of reproducing power.

Not having positive assurance as to the cause of this trouble, I can only say that it does not exist when the chicks are hatched by hens from eggs laid by hens that have continual freedom. Where the colony system has been properly applied for any length of time and the chicks are reared in the natural way, there is a most noticeable absence of anaemic chicks, and lack of vitality is almost an unknown quantity. During the past year I have seen thousands of eggs from yarded hens fail to produce a living chick; in one instance, over seven thousand eggs produced less than one thousand chicks, and not more than one-half of these were living at four weeks of age. Eggs from the same hens did little better when placed under hens for hatching, showing conclusively that there was not sufficient strength and vitality in the breeding stock to produce strong, healthy chicks; on the other hand, more than fifty per cent. is the record of the colony system farm.

"Well hatched" has a much stronger meaning than is generally accorded to this statement. You have undoubtedly been thoroughly well trained in the scientific terms as to what is lacking in the chicks that is not "well hatched;" but for the quick recognition of those of us who have not been so highly favored, let me say that well hatched chicks have *size, weight, strength, vigor,* and *vitality,* strongly visible in their general make-up, while on the other hand, all of these are wanting in the chicks that are not *"well hatched."* A chick cannot be well hatched from eggs that do not possess the elements equal to the production of the above named qualities, nor is it possible for fowls that lack vitality themselves to produce eggs that will bring into existence strong, healthy chicks. This being admitted as true, the first necessity for success is parent stock possessing marked vitality. When the real test of endurance comes to us in the way of unusual occurrences, such as heat, cold or disease, the greatest calamity occurs in the over crowded districts; tainted surroundings have a destroying influence on vitality; over crowding creates the cause of the loss of vitality. Tainted soil, the lack of natural exercise out in the open, over-crowding, and unnatural housing, is largely responsible for the lack of vitality in the producing stock. It is quite difficult to overcome this because the seed of destruction has been sown through many generations, and we must of necessity rebuild a foundation that has been undermined.

To continue without consideration the hatching and rearing of poultry by artificial means, is certain to destroy vitality, because it is so extremely artificial that the product is a hot house plant that is not intended for propagation, but for sale. We willingly admit the value of hatching and brooding machines of the present day; without them we could not grow poultry for market sufficient to half satisfy the people, but the producers are badly at fault when they destroy the vitality of the breeding stock by rearing them away from the mother hen.

The best poultry should be grown upon the farm; the farm is the natural home of the hen; there she can roam at will and live in a way that improves rather than depletes vitality. More poultry should be grown upon farms in the future than has been in the past, but more thought must be given to its production, or failure is assured. The cost of production advances each year, and the value of the best has advanced to meet this additional cost, but on the other hand, poor quality has never sold lower than it sells for at the present time. If you wish to succeed with poultry on the farm, remember that the way to accomplish this is to meet the requirements that demand that chicks must be—"well hatched, well fed, well grown, and well sold," and the parent stock must be strong in vitality and not lacking in any of the several requirements that are demanded by nature for the production of healthy offspring.

Mr. Geo. A. Robertson: (*a*) Has fertility any relation to the laying power of hens? (*b*) Will a hen that has been laying all winter, lay eggs that are as hatchable as one that has not? (*c*) What variation would you expect from pullets hatched from a good producing female of strong vitality, as to size of eggs, color, and shape of eggs, and fertility of eggs from these pullets, which would all be full sisters?

Mr. T. F. McGrew: (*a*) Fertility of the eggs has nothing whatever to do with the laying power of a hen. A thrifty, vigorous hen that produces eggs of an even quality is usually the hen that produces the eggs from which the best chicks are hatched. (*b*) A hen that is a continuous layer all winter will not produce eggs from which as large a percentage of chicks will be hatched, as will come from eggs laid by a hen in the spring, which has not reduced her vigor through excessive laying during the winter months. Chicks from hens that have not laid in the winter will be the stronger, providing the hens are of equal quality. (*c*) The influence of the hen over color and shape of eggs must come through the line of several years of careful breeding; color and shape of eggs cannot be established in less than three or four generations. The fertility of the eggs does not have the influence that you refer to; the strength and constitutional vigor of the hen makes possible the greater fertility. Lack of vitality reduces fertility; full brothers and sisters are weak in fertility.

Mr. Robertson: (*a*) In line breeding for eggs, would you expect to get as good layers from an old hen mated to a cockerel seven-eighths or fifteen-sixteenths of her own blood, as you would obtain from pullets seven-eighths or fifteen-sixteenths of her own blood grown from the best laying pullets of the original hen each year, and mated to a male bird not so closely related, but of the same blood line. (*b*) As a rule in any one breed, do the best layers usually mature early? (*c*) Are the best layers usually as large in size as poorer layers?

Mr. McGrew: (*a*) If you line breed for eggs so close as to mate seven-eighths or fifteen-sixteenths own blood, you will fail. The seven-eighths or fifteen-sixteenth pullets mated to a male distant in blood line, but of equal quality, will give you the best results. Line breeding so close as you mention can only be followed with the greatest care in the selection of the most vigorous females. Shape and color is gained in this way in all kinds of animals. Milk flow and egg production are greatly lessened if this method is followed. (*b*) The most continuous and heaviest egg producers for several years are not those maturing the earliest. Gradual but regular development brings the strongest and most active production. The best layers are not always the heaviest hens; size and weight are different. (*c*) A bird may be a good size and not weigh so much as a smaller specimen. The best proportion and average sized hens are usually the best egg producers.

Mr. Robertson: (*a*) Are pullets produced from a chance poor layer of a good laying strain likely to produce more good layers than a good laying individual of a poor laying strain? (*b*) If chickens are slow in maturing and quickly maturing males are used on old hens of slower maturity, what variation would you expect in the stock?

Mr. McGrew: (*a*) The chances for success from either of these are so slight that it would be folly to waste time with either specimens as probable producers of good laying pullets. Good blood lines should always be preferred to a chance shot. (*b*) The male will have so little influence over the quick maturing of the chicks as to almost leave him out of the question when considered in this way. New blood introduced in the male line quickens the growth; this same influence would come from new blood in the female line. It is the introduction of new blood that quickens the growth.

Mr. ROBERTSON: (*a*) Do not some individuals of the utility breeds which are inclined to put on inside fat, make continuous winter layers? If so, is it advisable to breed from birds of this type? (*b*) Do the best continuous winter layers as pullets always make the best laying yearling hens and two year old hens? (*c*) How should the best hens be picked for breeders?

Mr. McGREW: (*a*) Neither milk nor egg production comes so freely from fat gathering animals as from those that rob neither the pail nor the basket. Obesity is considered as a disease. Those that gather internal fat are not so prolific because the fat interferes largely with the working of the egg producing organs. Hens may gather fat and throw it off during the winter in heat and egg production, and they are not the best kind for foundation stock. (*b*) Usually the most prolific layers as pullets continue in the same line as yearlings and two year old hens, but there are exceptions to this which are governed by constitutional vigor. (*c*) As to how to pick the best hens for breeders, adopt the old Kentucky rule of "Like produces like," or "Follow the winners." For exhibition purposes, the most complete exhibition females properly mated give the best results. For egg production the best all-round egg producers are the kind to select for your foundation stock. Your males for egg production should be cockerels produced one year from your best hen, the following year from another of equal quality, and the third year in the same way; this continued in will establish vigor and egg production.

PROF. GRAHAM: I understand that a disqualified hen raised some very fine show specimens for you.

A.—Yes, to show you how ridiculous many of the qualifications are. That bare toe came by accident; that hen never grew a feather on her middle toe.

Q.—Do you know why she never grew a feather on her middle toe?

A.—I do not; the colored man I had made a pet of her and we put her in a yard by her self, and let her hatch her own chicks, and the exhibition fowl came from that hen. Up to that time I had been taught to slaughter the disqualified bird.

Q.—Do you think it is right to artificially color the feathers for show birds?

A.—Breed your show birds; do not color them in such a way that you are ashamed to look yourself in the face.

Q.—What is your criticism of the Rhode Island methods?

A.—I do not think it can be carried on by any other people unless they were trained from childhood, and I believe the colony system is the system of the future and the system we have got to adopt.

Q.—These people are simply farmers, and they use the farms to raise chickens?

A.—Yes, and raise enough feed on the farm to feed their horses and cows.

Q.—Do they breed from hens or pullets?

A.—They kept all their hens till the fall of the second year. I did not ask whether they used pullet's eggs for hatching or not.

Q.—Did you ask him why he did not use the incubators?

A.—Yes, and he said he thought he got along better with the hens. I asked him if he ever used incubators and he said, yes, and if a hen got sick or died he put the eggs into an incubator and hatched them out and gave the young to the hens.

Q.—What does that man pay his poultrymen to help on the farm?

A.—I think he told me he paid each one of his men $45 a month, and gave him a house to live in, and what they call farm privileges. They are thrifty people down there, and a house means an acre or two of ground, and farm privileges means so many eggs and poultry to eat.

Q.—What do you consider the average egg yield for Leghorns?

A.—They had 3,700 hens last year, and averaged 128 eggs apiece for the year.

Q.—If an earth floor is twelve inches above the ground, could that floor be anything but dry?

A.—Yes; I have seen some of them that are damp. It is hard to keep a number of fowl on a dirt floor and keep it sanitary. There is no way of cleaning it. If it could be managed I would always have a dirt floor, but it is not a safe floor to recommend to the average poultry keeper. The safest floor is a board floor, but the ideal floor is a board floor laid on top of cement.

Q.—What about mating?

A.—Always use cockerels hatched in March or earlier for the hens.

Q.—You get a male that is a good sire, and you breed him as a cockerel and he is a good producer· what are you going to make of him next year?

A.—Are you talking about exhibition stock; if so and you have a good one, never let go of him.

Q.—Woud you breed him to his daughters or to the hens he is mated with previously?

A.—I would rather mate him to the same hens. I would make any kind of mating except a full brother and sister. When I was breeding exhibition poultry my plan was to mate cockerels of this year to hens of last year, and this was continued for twelve years with a stock of Buff Cochins, and for nine years there never was anything came in in the shape of new blood but one hen.

Q.—I understand one gets these rare birds from a certain individual? In order to make that strain prepotent, is not it almost necessary to breed them very closely together?

A.—Every good animal, whether a horse, cow, sheep or a hen, comes from a good mother, and if you will be careful to select the producing line from the female, you need not pay so much attention to the males. It is better to have a male from a producing line. Don't inbreed too closely for any other purpose, than to fix the color. I believe if you inbreed your poultry for egg production you will lose. I believe if you follow with good males females that are good in the line you will succeed, but you cannot succeed in increasing your egg yield if you inbreed from that same lot of hens.

Q.—Were not the Shorthorn cattle inbred close in the beginning to fix the type?

A.—Yes.

Q.—Were not the Leicester sheep bred in the same way? Why not inbreed your chicken to fix production as well as color?

A.—In producing of Merino sheep, and in the upbuilding of fine horses and sheep in Scotland and England, the most promising young stock is sent, each year, from the Highlands down into the Lowlands of Scotland or England and *vice versa.* The breeding stock is interchanged in that way from the hills and the valleys to receive the environment that they will receive from the new soil and surroundings, and that is why they have kept up, for so many years the vitality of the Merino Sheep. If I wished to inbreed a certain strain, it would be to my advantage to have some one living 100 miles from here breed some of these birds for me. I toe-marked pullets and cockerels and sent them to Michigan and Pennsylvania and Indiana and left them there almost a year and then brought them back into my breeding yard.

Q.—You think it advisable?

A.—I would do it. If I had a strain I wanted to inbreed, I would never try to grow it right on the same ground. I would send it away and get an environment of different soil. I always select a limestone district for my Cochins.

Q.—Why?

A.—Because more bone and more feather will come from a limestone district than will come from clay or sand district.

Q.—As you increase the length of feather or fluffiness of feather, do you decrease egg production?

A.—It has been done in both Brahmas and Cochins.

Q.—Have you any observations to lead one to the conclusion that that is a fact?

A.—Notice the Wyandottes of the present time. Many years ago when the noted egg producing strains of light and dark Brahmas were prominent, I secured thirty eggs from each; a neighbor secured fifty eggs from a noted laying strain of dark Leghorns. He set the Leghorn eggs and I set the Brahma, and an equal number of Cochin eggs under the hens. When matured, twenty-seven pullets were selected—nine of each variety. The Buff Cochin pullets were the first to lay, and they outlayed both the Light and the Dark Brahma pullets. The Brahma and Cochin pullets produced more eggs than did the thirty brown Leghorn pullets. If the Brahma and Cochin hens had continued at the same ratio for a year, they would have laid about 160 eggs each. The test was continued from October to the end of April. My Buff Cochins were the best laying hens within a radius of many miles. Doctors used to frequent our home during the winter months to secure eggs for patients. This continued until we were forced into the fluffiness and feather in Buff Cochins.

Q.—By whom?

A.—By the Standard of Perfection. The change in this was brought about by a movement made by fanciers to increase the heavy feathering of all Cochins. Since that has been in vogue, all the Cochins and the Brahmas have become very poor producers.

Q.—You think if we did the same thing with Wyandottes, we would make the same mistake?

A.—Yes, I think so. It takes more blood to support and sustain the average comb and wattle of a Minorca than it does to make the eggs she lays.

Q.—Look at the exhibition Game, which is probably the tightest feathered bird there is?

A.—It is extremely tight feathered, but that does not increase the egg production. The game birds never were heavy layers. They are nearer to the wild state, and they were never trained to it. They are like the English Dorking, and the minute you get a good egg production strain, whether Brahmas, Cochins, Wyandottes or whatever they are, they drift into the Mediterranean type of body. If you breed Wyandottes long enough for egg producing strain, they will drift into what we call the European type of fowl.

Q.—What is that type?

A.—It is exemplified in the Hamburg, Leghorn, and Polish. Take the large poultry farms. They are breeding Leghorns that are inclined to be long in body and lean in the fluff; they do not have the curves we see on the exhibition birds.

Q.—The hen to lay a lot of eggs has got to eat a lot and must have a big crop?

A.—Yes.

Q.—Take the Indian Game, where you require the close feather, especially in the fluff, and you want square shoulders. Is that the reason why the Indian Game does not lay? Is it because the conformation is wrong?

A.—The Indian Game belongs to the Malay family, which is close to the wild type. They never were meant to lay any more eggs than enough to reproduce, and if you take them and work them for egg production as a man did over near Hartford, you could not tell they were Indian Game type at all.

Q.—As we revert towards the original type, we cannot have eggs?

A.—It is the same principle with the hen as with the cow. In the first place the cow has got to have a place to handle the food. If a cow is narrow between the legs, she cannot possibly have a place to put the milk, and if a hen is narrow between the legs, the strong bones press in and confine the egg forming organs, and that hen is not a good egg producer. You may have an exception; and if you will follow up that type you will squeeze the egg producing faculty out of them.

Q.—Is it fair to compare egg production to milk production or meat production or color production; does not it represent an entirely different part of the organism?

A.—I think the production of eggs and milk is identically the same. I do not think the color has anything to do with production.

Q.—You look upon the production of egs and milk as analogous?

A.—I do. They have both to be fed from the blood, and the same products produce both.

Q.—Would not the production of eggs and the production of calves be analogous?

A.—No, I do not think so; that which produces eggs and milk would not produce the calf. I think the production of eggs and milk are right in line. A cow takes a little more roughage than a hen, and a cow can handle more roughage than any other animal.

Q.—Will you tell us why you do not ask for the keel bone in the utility breeds to be covered with flesh?

A.—I have asked for so many things that often members of the Revision Committee wish I would go home, and I think if I started in with that keel bone they would get a gun. I know it should be so. If I am judging fowls with a score card in my hand and there is a prominent point in the bone, it gets a point out for shape.

Q.—Take a Plymouth Rock and tell me if it has got any meat on it?

A.—The breast is broad.

Q.—Has fertility any relation to laying power in a hen?

A.—Fertility is a life germ in that germ cell. If you mean hatchable eggs that is a different thing.

Q.—Do hatchability and laying power both go together?

A.—Experience has taught us that a hen that lays but thirty or forty eggs, and lays these eggs during the breeding season, will hatch thirty or forty chicks from these thirty or forty eggs. Experience has again taught us that a hen that lays 150 eggs manages to get the same thirty or forty out of her 150. I do not think that you have increased the possibility of reproduction one single bit. There are some things in nature that we can control, but I do not think it is within the possibility of man to produce a hen that will lay 200 eggs from which will be hatched 200 chicks.

Q.—Is there any advantage or disadvantage in the dropping boards being close up to the roost?

A.—It is filthy, and it is an injury, because it brings the fumes closer to the fowls. The advantage of a dropping-board is that it keeps the floor of the hen house clean much longer than it would be without it. If the house is frequently cleaned, the dropping-board can then be within six or eight inches of the roost. Red mites, the curse of the poultry house, frequent dropping-boards. These mites live in the cracks, crevices, and irregularities of the roost, and come forth at night to feast on the bodies of the fowls. Whether they suck the life blood of the fowls or not, they are a great nusiance, and an annoyance about the hen house. I do not think that red mites gain their whole living from fowls; I think that they feast from one another as well. The most efficient destroyer of red mites is turpentine. A small quantity of this will instantly destroy a world of them.

Q.—What variation would you expect from pullets hatched from a good producing female of a strong fertility as to size of eggs?

A.—The size of an egg is governed largely by the food and the exercise. Twenty-five hens shut up in a small lot will produce small eggs. Turn the same hens lose on a farm and in two weeks they will lay eggs that weigh almost a third more. Mate hens that lay a good brown egg to a male of the white shell variety and you will get a mixed color of shell, and take a pullet from one strain of Wyandotte and cross her with a male from enother you may change both the shape and the color of the egg from her progeny.

Mr. Robertson: I think fertility is hereditary much more than egg producing powers are.

Mr. McGrew: When you say you believe eggs hatched from this hen in August will also hatch from her pullets, I do not think it will have anything to do with it. The Leghorn naturally lays a white egg. Fifty years ago in order to improve the Leghorn, the Derby Game was used. This got a little tint into the egg-shell. When I was at Mr. Rice's I asked him to let me see the product of his Brown Leghorns, and there were twelve eggs that showed a little bit tinted.

Q.—Where does the tint of the Black Minorca egg come in?

A.—Some claim they have crossed in different fowl to improve the size of the Minorca. They never got these enormous sized Minorcas by accident.

Q.—If your chicks are slow in maturity, and you use quick maturing males with late maturing hens, what variation would you expect in the stock?

A.—Outside of color points and life giving influence, I think the male has so little do with it, it is hardly worthy of consideration. I think all these influences come from the mother hen.

Q.—What if you got a male from an outside flock that spoilt your laying flock in a year?

A.—I do not believe you could get a male that would spoil laying stock, unless you happened to get a male from a poor family. I would not give $10 for a specimen to breed from unless I could see both the sire and the dam. The only time I ever trusted my money for a stock breeding bird without seeing him was when I sent to England. Mr. Proctor is the only man that ever got my money until I saw the breeding pen from which I purchased the stock, and if I was going into any kind of breeding proposition, I would care a great deal more for the birds that produced than the specimen themselves. Inbreeding is the worst thing in the world for egg production. Some one has decided it is absolutely necessary for a hen to lay 700 eggs during her life, and he says if she lays 200 the first year she has only got the balance of them to lay as she lives out her natural life. I don't believe that at all. But I do believe that when you get an audience that will sit still as long as you have, you have a good one. (Applause and laughter.)

POULTRY RAISING.

By L. H. Baldwin, Toronto.

My subject must be a rather informal talk on the question of poultry raising. When we realize the number of poultry that are kept in this Province and the other Provinces of the Dominion, and realize what the product from that poultry must be, it is a very large amount, and if we appreciate what it means to grow two chickens where we only grew one before, or even to get one or two more eggs from our laying hens, it means in the total sum a very large increase in the producing power of the country. We often hear that poultry farms do not pay, and that poultry does not pay even in a small way on the farm. A great many keep poultry for private use; but they say they do not think they pay. From the experience I have had in poultry raising, I am perfectly convinced that the question of profit or loss with poultry is practically identical with the question of profit or loss on the farm or in the garden. If a farmer can cultivate his fields so as to secure a full crop, he will make farming profitable. If on the other hand, he is an indifferent farmer, does not put the proper work into his fields, and does not keep them in good shape, and if he is not careful in the selection of his seed grain and to see that the seed is planted at the right time, it grows in a weakly state, and the weeds smother out part of the crop. The result is that when the crop is harvested and threshed, he has only a half a crop. If he had put a little more time to get the soil in proper shape, he might have raised a full crop. The ploughing and seeding and harvesting and threshing has to be done just the same for a poor crop as for a good one, and the poor crop barely pays for the cost of cultivation, and leaves nothing for profit.

I believe the same is true with regard to poultry. If we only get half a crop in poultry, poultry farming does not pay. If we can only get a full crop of poultry, poultry is a very profitable adjunct to the farm, and I believe can be made a profitable enterprise even as a specialty.

The question is how are we going to secure a full crop of poultry? Let me illustrate it in this way: if we have a poultry farm which requires the production of 1,000 birds to meet expenses, then you require another thousand birds upon which to realize your profit. If you start out at the end of your hatching season with two thousand birds, every bird that dies is so much off your profit. If you lose five hundred birds, half your profit is gone. If you lose one thousand birds, you have lost 50 per cent. of your stock, which means all your profit, and the loss after that means you are so much behind. Now, you can see how important it is that we should have a full crop, and the question is how are we going to secure a full crop? Every speaker has pointed out how to give us good hatchable eggs, so as to get good strong chicks. It is also important that these eggs should be hatched at the proper time. I think a great many of us are apt to delay the period of hatching. I suppose under natural conditions the bird makes her nest and hatches her young every year at about the same time, so that naturally a pullet would commence laying at just about the period at which she herself had been hatched. We know, however, that it is easy to develop our pullets and have them laying in January. There is no doubt that winter layers are the best branch for profit in poultry. You can sell eggs in the winter time at 50 or 60 cents a dozen, while the summer price is only 15 to 20 cents. That is a great difference; one egg in the winter equals two or three eggs in the summer.

Two things are very prominently before us in securing birds to make good winter layers. First of all we must have a number of birds from which to select our layers, and we have to cull very strenuously, and that is a pretty hard thing to do. We have hen houses to accommodate a certain number of birds, and we like to see those houses filled. In order to have profitable winter layers in sufficient number, it is most important that the poor layers should be culled out. Then the mortality amongst our chicks has been altogether too heavy. If we could secure in chicks 50 per cent. of the total eggs set it would not be so bad, that is taking two eggs to produce a chick. I think we ought to secure more when we have proper conditions. Having hatched 50 per cent. of the total eggs set, we are able, I think, to stand a loss of probably 30 per cent., certainly 20 per cent., and yet have a fair proportion of our flock left to make profitable returns; but when the loss amounts to 40 or 50 per cent., and sometimes 60 or 75 per cent. of the birds you have hatched, it is discouraging, and makes a losing business. When we want to produce a large number of birds, especially early in the year, the question arises how are we to hatch them? Undoubtedly the more reliable source is the hen. I think, however, when you consider for a moment the conditions to which our breeds have been brought by careful selection, that our hens are to a large extent artificial, that hatching the eggs under them is almost as artificial as hatching eggs in an incubator—when we get thirty or forty broody hens sitting at once, it does not take long to realize that they are altogether too artificial.

In order to get a number of chicks hatched early, we must rely on incubators, and that leads us to the difficulty we have had with incubators; we have had such serious losses. The question was raised some years ago whether there were not some defects in our method of incubation. It was perfectly manifest that there was some scourge that was carrying off our chicks when they were from three to ten days old, carrying them off in such numbers that there was manifestly something radically wrong. I think this mortality with incubator hatched chicks gave rise to the many chick feeds that have been advertised by poultry supply men. They contended that the loss of the chicks was due to defects in feeding, and if we would only buy such and such a chick feed, we would have satisfactory results; and they would send you letters from poultry men who had fed their chick feed and had had no losses. I have always contended that if we cannot raise chicks with the ordinary mixtures of feed we have on the farm: wheat, corn and oats, there is something wrong about the poultry business, and something wrong about the chicks we feed.

We have heard the excellent address given by Dr. Morse, and we appreciate greatly the work he has done as a scientist, and we have enjoyed his first lecture. There can be no doubt whatever of the presence of these germs, and I am quite willing to agree with Dr. Morse in the mortality of the chicks being probably attributable to this germ; but why is it to be attributed to the ravages of this germ? That is the question.

In my experience, and I have repeated it often, I made probably as great a success at operating incubators as any one in this country. And I can say that without appearing to be boasting, because I can now see that there was nothing to crow about; as Professor Graham often says, "I was a fool for luck." I started out with many men saying to me, "You cannot make poultry a success when you rely on artificial incubation. The vigor of your flock will die out and you will not succeed." I made up my mind I would not hatch a single egg under a hen, and rely on nothing but an incubator. I secured some birds—White Leghorns—and later on some White Wyandottes. Every year, I incubated entirely by artificial means. At first I had some trouble with roup, but I adhered rigidly to the advice I got from our good friend Mr. A. F. Hunter, to use the axe and not to attempt to treat them. If ever I had a weak bird it was knocked on the head. From year to year the vigor of my stock improved; their egg laying capacity in the winter especially increased. The hatchability of the eggs they produced improved considerably until in the final year of my success I set about 1,200 eggs and I hatched 66 per cent. of the total eggs set—for every 100 eggs I put into the machine that season I got 66 chicks. I have not accurate records of the mortality, but I believe it was not over 10 per cent. of the total number of chicks hatched, and as soon as my chicks reached the age of ten days I had no more worry about them whatever. The only loss I had afterwards was from accidents, dogs, cats, and crows, and I did not lose a great many even by these means. They were a thrifty, active vigorous lot of birds, and turned out most excellent winter layers. Their table qualities were of the best, and my birds were sought for and appreciated. I did not do any crate feeding. I used to catch them right from the fields and kill them, pluck them, and send them to market.

I then changed my conditions, moved my poultry plant to another part of the estate, and built there a special incubator room. The first year I continued to hatch under the old conditions, and I brooded on the farm on absolutely new ground, and the chicks did as well as they had done before. For eight years I had raised my chicks on the same ground and they kept getting better and better. The first year on the new farm, my birds did splendidly, and the next year I moved my incubators, and I just tumbled over a precipice. That brings me to the point that there must have been something in the condition in the one case different to the other that made a failure; and the question is, what was this contrast in conditions? You may ask, did I ever try running my machine as I did originally? Perhaps it will surprise you if I tell you that it has taken me about four years to find out how I did run them originally, although I kept accurate record of how I did run them. There are so many variations in the application of moisture, ventilation, and temperature that it is not easy to go right back to original methods. There was to my mind a positive evidence of a lack of normal development of the chickens; they were ill nourished chicks.

The most extreme case I ever had was in an incubator where the chicks had White Diarrhoea written on their faces. I examined every egg that did not hatch, and found one chick alive and kicking, but its body was not as big as the yolk sack to which it was attached.

If that chick was to be nourished, it was with that yolk and it had to get that yolk into its system; probably its organs might exercise some influence in the assimilation of that yolk. I do not know whether they do or not. These organs are probably the first part of the chick developed. The lack of the assimilation of this yolk showed that the chick had not actively fed on that nourishment, and that is probably the reason a good many chicks do not kick themselves free from the shell; even if they do kick themselves free from the shells they are still ill nourished to such an extent that their vigor and stamina have been spoiled to a certain extent.

Now, if you go into your garden and you have a row of plants; here is a rugged, vigorous, growing plant, and her is a weak plant that has not substance and soil to give it vigorous growth, and it is thin and pale. What do you nearly always find? You will find this weak stalk covered with insects, and they won't attack a strong one; they know the stalk that is weak and tender and they attack it. This is an illustration of insects finding a weak plant and attacking it; they may go on to the strong plant, but they find it tough, and leave it alone. And that just brings us to the point of difference—if there is any difference, but I do not think there is any conflict between Dr. Morse's position and mine; because one cannot shut one's eyes to scientific facts, nor can one shut one's eyes to what one has observed. Dr. Morse's observation of this subject is limited. I am perfectly willing to say mine is also limited. I lack the opportunity of scientific investigation, except what I have had through being associated with the professors here and with some medical men in Toronto who have used the microscope. Dr. Wagner has been a very great friend of mine, and he is a demonstrator at the Toronto University. He has frequently come to my farm and discussed these matters with me. On the other hand, Dr. Morse wants knowledge of the science of operating an incubator, and I wish he had that knowledge, because I am convinced there is something in the operation of the incubator that, in one case, will produce a strong healthy chick and in the other case a weakling.

Dr. Morse says he might find diphtheria germs in my throat; but that would not worry me. But if something occurs so that that germ gets its work in, I have then got to send for a doctor, and he tells me the trouble, and he at once applies remedies to sustain my strength and stop the ravages of the germ. I do not think that there is any cure for this trouble with the chicks, and if there is, it is going to be of very little use; because I am perfectly sure that the chicks that have an attack of that kind are poor birds to have in your stock. It is quite true that diphtheria and many of these germs are encouraged in their attack by unhealthy conditions, and it is quite true that our health inspectors try to investigate and to adopt measures to keep these unhealthy conditions from occurring; and not only are there unhealthy conditions that encourage the ravages of diphtheria, but there is the question of maintaining a healthy life, and doctors and professors may be more concerned about making the conditions healthy, while we are concerned about maintaining healthy condition in our own lives, and that is what we want to do with regard to incubation.

We are more concerned in the science of incubation so that we may know when and how to turn out a strong chick, a chick that it takes a club to kill, and that it the profitable chick. We do not want to turn out these weaklings that are so difficult to raise. I think myself that there are many little things in connection with artificial incubation that we have lost sight of and that have to be considered. We are gradually, step by step getting hold of information that will enable us to improve conditions under which we are incubating.

The question of temperature, the question of humidity, and the question of ventilation. You may have a good, strong germinating seed, but unless that seed is sown in the ground under conditions of temperature that encourage germination, germination is apt to be delayed and the seed injured and result in a poor crop. With eggs in an incubator there may be defects in the temperature and the question is what temperature we should start our eggs at in the incubator and then at what temperature we should keep the incubator at throughout the period of incubation, and I would suggest for those who would wish to experiment or who have difficulty in incubation to see if they cannot improve matters by trying a higher temperature to start the germ. My experience has been that if I give an extra amount of heat at the start I give a vigorous character to the germ.

Then the question of ventilation. I think that is also associated with the question of carbon dioxide, and we can see how the combination of humidity and carbon dioxide may soften the shell and make it more easily assimilated so that the chick assimilates more of the lime of the egg. We know that the shell is very much harder after hatching in an incubator than the shell of an egg hatched under a hen, and so I say that the question of ventilation is associated with the question of carbon dioxide. I think it is wise to keep the ventilators closed as much as possible, especially at the early part of the hatch. I do not think they require any ventilation at all until the tenth or eleventh day, then I think you should begin to ventilate freely when the life begins to quicken and develop. Close the ventilators until the middle of the hatch and then give pretty free ventilation.

I think humidity is an essential factor in the question of incubation, and we should moisten more at the early part of the hatch than the latter part, and I have hatched good chicks without humidity at the early part of the hatch.

I should not take more time. Dr. Morse is here and I wish to give him an opportunity to say as much as he can, and I hope you will forgive me for taking up the time I have in putting before you just that difference between Dr. Morse's position and mine. I am not at all antagonistic to his position, I entirely agree with all the work he has done, but I think the crucical point is not that the *Coccidium tenellum* is present, but that the *Coccidium tenellum* manages to do the work it does in certain chicks and not in others. (Applause.)

Dr. Morse is going to illustrate, I understand, the same subject he presented to us before, and as you know many of us believe a good deal more through our eyes than we do through our ears. Dr. Morse is going to have that advantage over me to-night.

ILLUSTRATED ADDRESS.

By Dr. G. B. Morse, Washington, D.C.

I had supposed in coming here to-night, that we should be free from that old subject of White Diarrhoea of chicks. I could not help thinking to-night, and also yesterday morning, of the old story of the woman who was thrown into the river by her husband because, in an argument, she persisted in saying that it was "scissors" when he said it was not. It is related that the last seen of her as she went down for the last time was a hand still raised above the water's surface, with the first and second fingers held scissor fashion to testify to her unaltered belief. I begin to see why Professor Graham places Mr. Baldwin and myself together upon this subject, and why they did so at the American Poultry Association last August. When you have Mr. Baldwin and Dr. Morse upon White Diarrhoea of chicks you have the *long* and the *short* of the subject, so that when we get through with it there is no more to be said. However, I feel very safe regarding my own position. Down in the States, next Friday, they are going to celebrate the birth of a great man who was at once the saddest, most serious, yet withal, the drollest, and, perhaps, wittiest man that was ever developed upon the United States' soil. Abraham Lincoln was a wise man and said some very wise things. He was an adept at meeting difficult questions in a most pleasant way. He was once asked how long a man's legs ought to be. Mr. Lincoln replied that he had never studied the question carefully, but that just on the moment's thought he would say, "they ought to be long enough to comfortably reach the ground."

Now, ladies and gentlemen, I want to say to-night that even though I do of necessity represent the short of it, still I am happy to say that I am quite satisfied that, in regard to this question of White Diarrhoea in chicks, my legs are long enough to reach the ground. They reach scientific ground, and on that ground I am willing to stand.

Dr. Morse then illustrated by lantern slides the points he had made in his former address.

The CHAIRMAN: I am sure we have enjoyed Dr. Morse's illustrated lecture and the presentation of his case, and we thank him for it very sincerely. I now declare the convention closed.

SECOND ANNUAL REPORT

OF THE

ONTARIO
Corn Growers' Association

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1910

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WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Annual Report of the Ontario Corn Growers' Association.

Respectfully submitted,

JAMES S. DUFF,
Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,
Toronto, 1910.

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A. E. Wark, Wanstead.

TREASURER'S REPORT.

* Report of Treasurer of Ontario Corn Growers' Association for year ending February 4th, 1910.

RECEIPTS.

Membership fees	$266 50
Legislative grant	250 00
Essex County Council grant	200 00
Kent County Council grant	200 00
Municipal grants	165 00
Donations	150 00
Advertising in Prize List	86 25
Corn sold Immigration Dept.	30 00
Lumber (shelving) sold	6 00
Interest	6 34
Total	$1,360 09

EXPENDITURES.

Cash for prizes	$541 00
Travelling expenses	121 70
Printing	201 70
Postage	28 50
Rent of building for Exhibition	40 00
Shelving	37 20
Corn for Exhibition (Essex and Toronto)	27 00
Exchange on checks	1 78
Auditing	2 00
Cash for prizes in three School Sections	15 00
Express	11 00
Fuel and rent of stoves for Exhibition	10 50
Hotel and board bills	29 75
Expense of Judge and Speakers	103 10
Stenographer	75 00
Hardware Account	5 83
Cartage	2 80
Refund to Township of Romney	3 50
Labor and Police	16 50
Incidentals	66 90
Balance on hand	19 33
Total	$1,360 09

Examined and found correct,
this 4th day of February, 1910.

B. A. Smith,
Auditor.

ONTARIO CORN GROWERS' ASSOCIATION.

PRESIDENT'S ADDRESS.

J. O. DUKE, OLINDA.

I have great pleasure in welcoming you to this, our second Annual Convention. I am pleased to see such a large number present, and the enthusiasm marked in your faces. There is no doubt that we intend to go ahead with this good work. The object of these meetings is not only to teach how to grow better corn and more of it, but to show to you the real value of the land you possess. As it now stands the very poorest land in this country is the most valuable.

There is a farm near Leamington that was abandoned twenty years ago. The present owner told me that thirty-five hundred dollars was realized from thirteen acres in a single season, and that is the poorest land we have in Essex County and is selling for $200.00 and more per acre. We want to get our people up to the point where they can get the very best out of the land and to grow better crops, and I have no doubt but that we can make the land in this section just as valuable as the land near Leamington.

Last year I heard of land in this County on which they can grow $40 worth of corn per acre, which was sold at public auction for $23 an acre. This Corn Association is going to try and show the people of Essex and the people of Ontario that these corn lands are valuable, much more valuable than we think they are. I can go out with $50 and buy an acre of corn land, and if it was in the corn belt States of America it could not be bought for $200. Any land that you are selling for $50 an acre is worth four times that much.

I had a neighbor who wanted to sell his land for $50 an acre, but I advised him to drain it and put in corn, and he did so. He got $40 an acre for his corn the first year, and had all the small ears and fodder as a side profit.

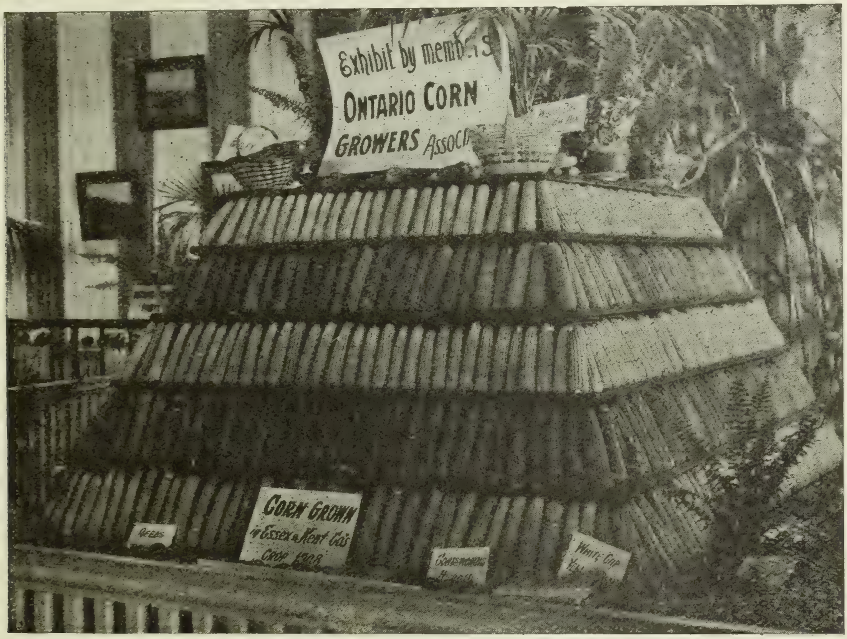
You will find that if you tile your lands you will have a new farm. There is a reservoir of fertility in the soil here that has never been touched, because it is always flooded in a sea of water. The Executive of this Association realized this, and that is why we put on this tile question. The Clay Workers are holding their Convention in this town at the present time, and tile will be pretty thoroughly discussed.

I believe this meeting will be for the benefit of the farmers and make better crops and better farming. I think this is a work in the right line. Last year we had a Convention here, which was very largely attended and everybody who was present went home and said, "I am sorry I did not start to go sooner, I did not go until the second day," and those who did go on the second day regretted that they did not go earlier. I have noticed in the papers the accounts of the great development that is taking place throughout Canada, and you will find that this means commercial development. You will find that they are putting up a bridge in Quebec, costing ten million dollars, and on the G.T.P. that will cost two hundred millions. These are very necessary developments, but I consider that the greatest development is when you develop the people who inhabit the land. And if we, as Corn Growers, can undertake to learn more about our conditions and surroundings, we are gradually making developments that are worth while.

I was over in Omaha a couple of months ago at the National Corn Exhibition, and the people were telling how they grew corn. It was very interesting to me to find that in Texas they grow peanuts, and plow them under as a fertilizer. That would not be practical in Essex. In Connecticut they plow under fish.

A gentleman from Indiana got up and said that it would be folly for him to tell them how he grew corn, because he did not grow it in the same way every year. He said you must consider your conditions.

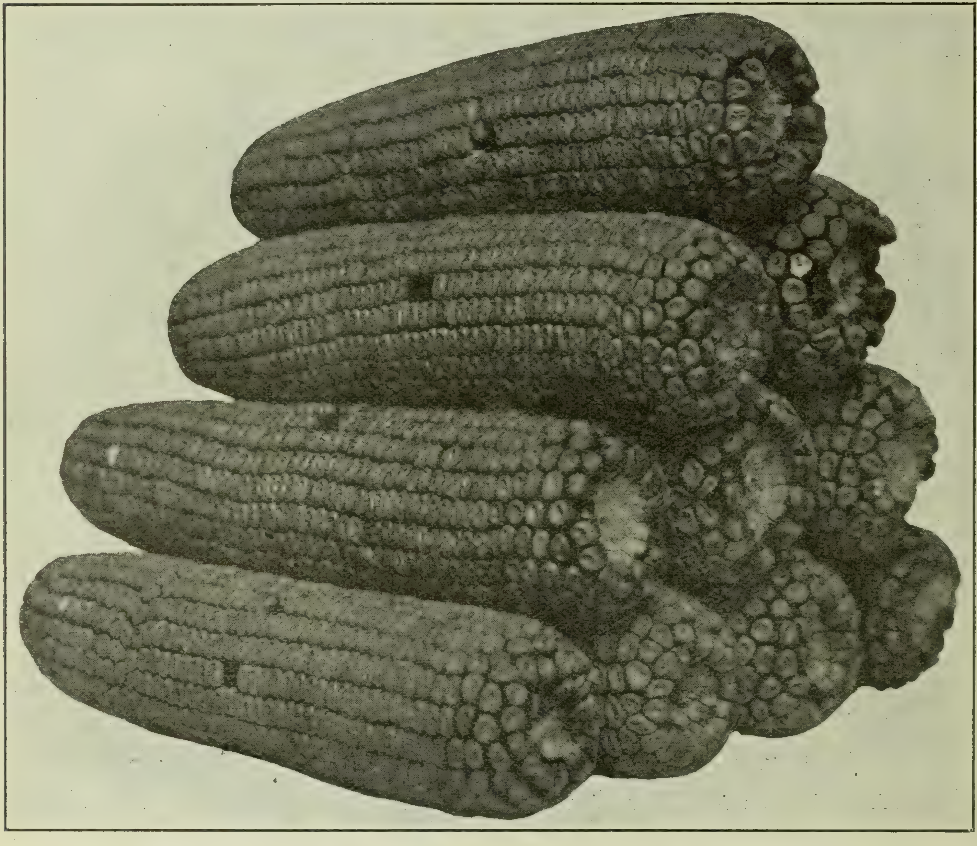
The particular condition here in this country is excess of moisture. We never have it too hot or too dry, but on these clay lands, the trouble is we cannot get on and work them when we should; we have too much moisture, and that is the reason we are going to give you some addresses on tile drainage. We are anxious that everybody should be here to hear Professor Day explain the reason why tile should be put in.



Exhibited by the Corn Growers' Association, Canadian National Exhibition, 1909.

I do not think that Canada should aspire to be a great military or naval power, but I think she can one day be a great agricultural country.

At the present time our Government is paying six million dollars a year to the militia, and they are now contemplating paying ten or twenty million dollars to a navy, but for the improvement of agriculture they are only expending one million dollars. I believe that if these figures were reversed we would come to the front so rapidly, that there would be no country in the world in competition with us. We have the vast West in which to grow wheat, and we have this country down here in which to grow corn to supply the dairymen of the east with their seed. We seem to be a link in the chain that will make this country prosperous. Canada is a corn producing country, but her corn is sold in the shape of cheese and butter. Canada has a great reputation for being a dairy country, and controls the markets of the Old Country in that line to a great extent. We produce products that make it possible to produce cheap milk. Hay is very expensive, and I am shipping hay into the Ottawa Valley at prices that are ruinous. I am shipping hay to dairymen near Toronto at prices that the farmer cannot afford to pay, and he must grow ensilage. Ensilage costs less than three or four dollars a ton, and it will produce more milk than hay. Dairymen in the eastern portion of Ontario find that American corn does not fill the bill. If you bring alfalfa seed from the United States it will not give as good results as Canadian grown seed because Canadian seed is adapted to our conditions. There is no plant in the world that is more easily affected than corn. If you bring the big white corn from Kansas, you will get nothing but a coarse grass, but if that corn from Kansas is brought to Indiana, and then to Ohio, and then to Essex and to London, from London to Guelph, year after year, by the time it gets to Guelph, it is pretty well adapted to Canadian conditions.

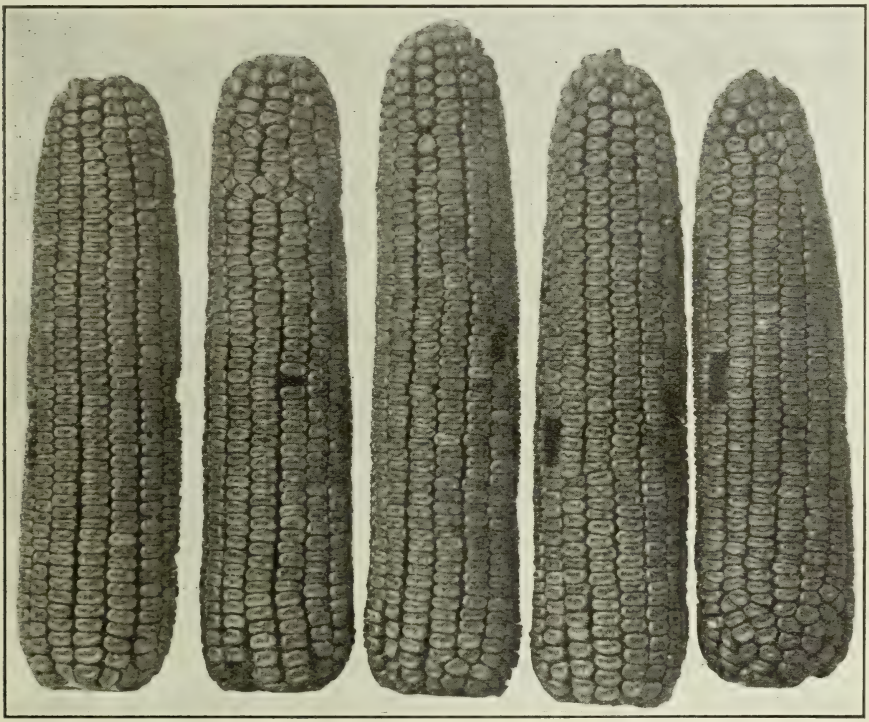


Grand Champion, 10 ears dent corn. Ontario Corn Exhibition, 1910.

You will notice in the show one exhibit of corn, and every grain is a different color. That is the old " Squaw " corn, that was found in the graves of the Indians by the Pilgrim Fathers, when they nearly starved that first winter. This is the original corn. All the different varieties have their origin in this corn, but by careful study, breeding and selecting, we have been able to grow corn that will produce better results, and fill more silos than anywhere else in the world. It behoves us to grow better corn and more of it, and that is the reason we started this Association.

The corn crop offers a great field for work. Take the man that grows fifty bushels of ears to the acre, he has a pretty small crop of corn, and all he can get, at a fair market price, is about $12.50 an acre; and that is about what it costs him to grow that corn, plant, harrow, and cultivate the land. A man who is getting one hundred bushels has from $35 to $50 an acre. If he has $50 an acre he has $38 profit.

Where land is not being worked on account of being too wet, it is impossible to grow good corn, and if you have fifty acres of land, I would advise you to spend $12 an acre on it and tile it, instead of buying another fifty acres, because every acre of land that you tile, will produce you twice as much as it did before. Therefore you can buy an acre of land for $12.00, and if you only increase the yield by one-third, it would pay you. A little work in the corn field does a lot of good.



Sweepstakes, 5 ears dent corn in Junior Department, Ontario Corn Exhibition, 1910.

A great many people go into the corn field to kill weeds. You should go in to cultivate the corn. There is always plenty of work to do in the corn fields.

An exhibit like this never reaches such a state of perfection without the efforts of some individual. We have a man living in Essex, whom I think does not get enough credit for the work he does, and that man is Mr. McKenney, and I do not think anybody works quite as hard as he does, and I think we should appreciate his efforts. He has been a great benefit to the people of the County of Essex and to the whole Province of Ontario. And I am glad that there are others who think as I do upon that question. I do not think we want men of war to protect us, but I think we want men like Mr. McKenney and Prof. Klinck, men of peace, who stand for better crops and more of them.

REPORT OF THE SECRETARY, 1909.

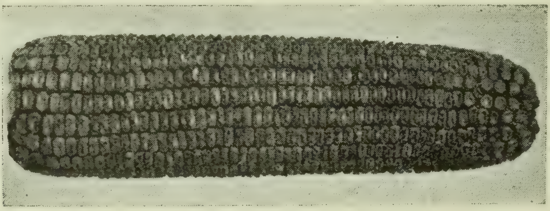
The past year, although the first in the history of the Ontario Corn Growers' Association, has been a very satisfactory one to the officers and directors of the Association.

The membership at the present time is 588, the members being mostly corn growers residing in the counties of Essex and Kent. A few have, however, come into the Association from the adjoining counties.

The work of the Association during the past year has consisted mainly in interesting the farmers of Ontario in the work of the Association. An effort was made to advertise Southwestern Ontario seed corn by displaying an attractive exhibit of corn at the Industrial Exhibition, Toronto. This was viewed by thousands of farmers and others, and did much to turn the attention of farmers in other portions of the Province toward Southwestern Ontario as a source from which good seed corn might be obtained.

An especially valuable feature of the season's work was the holding of several Rural School Corn Fairs.

A central school was selected in each of several townships, and a Corn Fair advertised for a certain date. All pupils residing within the township were eligible to compete for prizes offered by the Association. The average number of exhibits at these fairs was well over one hundred.



Grand Champion, single ear dent corn.
Ontario Corn Exhibition, 1910.

These fairs have done more than anything else to interest the growers in the production of more and better corn, for by reaching the children the parents have invariably become interested.

The thanks of the Association is due to the Public School Inspectors and teachers who have given the movement their loyal support. The Exhibition and Convention has this year far exceeded the expectations of the Directors. The number of exhibits has increased from 123 in 1908 to 800 in 1909. The attendance also has increased in about the same proportion as the exhibits. An effort will be made during the season of 1910 to carry on experimental work with corn in the different districts of the Province, with the idea of finding out the most suitable varieties for ensilage purposes in these different sections.

A survey of conditions of corn production has been made in eleven different counties of the Province. Much valuable data has been collected, and it is the intention of the Directors of the Association to extend this work as rapidly as possible.

The Association is indebted to the different representatives of the Department of Agriculture for collecting this information in their respective counties.

The Association is at present in a prosperous condition, and I think we can look forward to an even more successful season during 1910.

The Executive have been especially fortunate in obtaining speakers for this Convention. Prof. C. G. Williams, Wooster, Ohio; Prof. L. S. Klinck, Macdonald College, and the different members of the staff of the Ontario Agricultural College have been very painstaking in their efforts to give assistance in solving the various problems in connection with the production of more and better corn.

CORN JUDGING.

PROF. L. S. KLINCK, MACDONALD COLLEGE, QUE.

I can assure you it gives me unusual pleasure to have this opportunity of addressing the corn growers of Ontario once more. Last year I spent such a profitable week in Essex at your first Annual Corn Convention that I have been looking forward with pleasure for almost a year to this meeting. The interest and enthusiasm aroused as a result of last year's meeting has evidently not decreased if the attendance at this opening session, and the number and quality of the exhibits in the rink, is any criterion.

I cannot say that I come with anything new or startling on the subject of corn. Fortunately the essentials for a successful convention are not necessarily new things. Every corn grower worthy the name already knows enough about his business to grow much larger crops than he has yet produced. What we all need is to be "jogged up" a little occasionally, to touch elbows with other growers and to have our minds stirred up by way of remembrance. The things we do, not necessarily the things we know, are the things that count for most.

In a convention such as this it is not so much a matter of someone giving a number of facts, interesting and instructive as these may be; what is needed is the spirit which characterized last year's sessions—the spirit of enthusiasm and buoyant optimism based on knowledge—the spirit which finds expression in an honest attempt to apply the facts learned, and which results in the production of "Better Corn and More of It."

Fortunately in last year's Convention this spirit of practical uplift was not confined alone to the men who produce corn. In fact, the movement in its initial stages was accorded more support by the business men of the town than by the corn growers themselves. As a result, the movement has meant more to this district than merely increased yields of corn. It has meant greater sympathy between the town and the country; it has tended to unify interests too often regarded as widely divergent; it has directed the attention of the people of Southwestern Ontario to some of the possibilities of agriculture, and it has lifted more than one man out of himself and given him a clearer conception of the scope and dignity of his calling. In a word, it has been educative, differing from a college course in degree only, not materially in kind.

When your President was speaking of hearing Essex mentioned at the recent National Corn Exposition at Omaha, I could not but be reminded of the interest aroused by the publication of this Association's first Annual Report. That report came as a revelation to thousands in Ontario and Quebec. These people were not aware that these counties were capable of producing such immense quantities of high-grade seed corn. By way of advertising Essex and Kent, as well as Ontario as a whole, that report did a great deal. Especially has it attracted the attention of dairymen in Eastern Ontario and Quebec. These men are vitally interested in procuring seed corn of known breeding adaptability for the production of ensilage, and in these Lake Erie counties they now see the possibility of there being developed strains of acclimatized corns especially adapted to their requirements. With so many prospective buyers looking in this direction for seed corn, it behoves growers to pay the strictest attention to the production of seed of the highest quality. One or two careless or unscrupulous men in a district, who do business on the reputation of others, and who sacrifice future trade for present gain, can do more harm to the seed corn business at this juncture than a score of honest, painstaking men who know good seed and who prefer to make no sale rather than dispose of poor seed can do good. Now that dairymen have had their attention directed to Canadian-grown seed corn, it will be to the interests of all growers to study the requirements of the trade and to aim to supply exactly what is demanded. To direct your attention to the requirements of this trade, and the means by which the demand may be met, is the object I have in appearing before you.

I am well aware that some will differ with me as to what constitutes a good corn for seed, just as some ensilage growers differ with me as to what constitutes a good corn for the silo. As some dairymen produce an immense tonnage of sour ensilage from rank, succulent stalks, which bear little or no grain, and seem to prefer that kind to a smaller tonnage per acre of properly matured stalk and ear, just because it makes a bigger showing in tons, so some seed growers will insist on the big ear. Some few there are, who are especially favorably situated, who can mature larger ears with certainty but the number is so small as to constitute the great exception and not the rule. I do not favor a corn so large that it cannot be depended upon with certainty to mature in the average season. When one has made a careful study of the ten thousand ears which have been exhibited here during the past two years he will have had the most conclusive evidence in favor of the medium-sized early-maturing ear for the general grower.

In order that the subject of corn and corn growing might be presented and discussed in the most effective way, your directors have asked me to conduct a class in corn judging each morning. Last year provision was made for considerable speaking but no serious attempt was made to have the men in attendance do much actual work with corn. This year, however, your Executive has greater faith in your interest in this subject and has made ample provision for judging work. Good representative varieties have been secured in sufficient quantity to give each man a sample of five ears, so chosen as to illustrate the points to be touched upon during that morning's work. These samples will be changed each morning, always with a view to having them bear most directly upon the work of the day. At the conclusion of each morning's work in judging, a half hour will be devoted to a general discussion of the points noted. In this connection charts will be used to further supplement and illustrate the work. Such a presentation of the subject should prove more interesting and instructive than a series of illustrated talks could possibly be, for while corn is an interesting thing to talk about, it is infinitely more interesting to work with.

Corn naturally lends itself to a study of this kind. Those of you who have attended short courses on small grains know how difficult it is to make a satisfactory study of wheat or oats. If you take a head of wheat and rub it out you have perhaps fifty grains, but these bear no clear relation to one another. The grains are small, and unless the student is accustomed to studying them he cannot see the point the instructor is trying to make. As a result he has to draw largely upon his imagination, and frequently has reason to believe the instructor is drawing upon his.

With corn it is very different. Instead of fifty small, disconnected grains, you have frequently a thousand or more grains aggregated on a single cob and admirably arranged so as to lend themselves to a comparative study. After the characteristics of the ear as a whole have been determined, one finds the individual grains are of sufficient size to admit of a careful study, and so distinct are the lines of demarcation that, with the aid of an ordinary pocket knife, anyone may easily determine for himself seven distinct areas, which differ from each other in texture and composition, and consequently are of different feeding value. A good working knowledge of these, and other closely-related facts, is essential to successful corn growing and to a consideration of these our attention will now be directed.

(At this point a card explaining the terms used in describing an ear of corn was given to each man, together with a five ear sample, and by means of charts, bromides and samples of corn in the ear, an illustrated talk was given which enabled the men to familiarize themselves with the terms used in discussing the essential points of a good seed ear. This introductory session paved the way for three succeeding sessions in corn judging.)

TERMS USED FOR DESCRIBING CORN.

Shape of Ear.
- Cylindrical.
- Tapering.
- Very Tapering.

Length of Ear.
- Long (over 9½ inches).
- Medium (7½ to 9½ inches).
- Short (less than 7½ inches).

Circumference of Ear.
- Large (over 7½ inches).
- Medium (5½ to 7½ inches).
- Small (under 5½ inches).

Color of Kernel.
- Yellow.
- White.
- Red.
- Variegated.

Indentation of Kernel.
- Smooth.
- Dimpled.
- Deeply Dented.

Shape of Kernel.
- Wedge.
- Round.
- Square.
- Parallel-Sided.
- Pointed.

Length of Kernel.
- Long.
- Medium.
- Short.

Number of Rows of Kernel.
- Many (20 or more).
- Medium (14 to 20).
- Few (under 14).

Space Between Rows.
(At crown of kernel.)
- Wide.
- Close.

(At Cob.)
- Wide.
- Close.

Arrangement of Rows.
- Distinct.
- Paired.

Tips.
- Covered.
- Exposed.

Swell of Butt.
- Deeply Rounded.
- Moderately Rounded.
- Flat.

Size of Butt.
- Enlarged.
- Uniform.

Size of Shank.
- Small.
- Medium.
- Large.

Size of Cob.
- Small.
- Medium.
- Large.

Color of Cob.
- Red.
- White.

SCORE-CARD FOR SEED CORN.

Scale of Points	Possible Score	Ear 1	Ear 2	Ear 3	Ear 4	Ear 5	Ear 6	Ear 7	Ear 8	Ear 9	Ear 10
Trueness of type..........	10										
Shape of ear..............	10										
Color of kernels........ ..	5										
Color of cob..............	5										
Vitality or seed condition ..	15										
Tips of ears	5										
Butts of ears..............	5										
Uniformity and shape of kernels	15										
Length of ear............	5										
Circumference of ear..	5										
Furrows between rows ...	5										
Space between tip of kernels at cob	5										
Proportion of corn to cob..	10										
Total..............	100										

Varieties of corn scored ....

Name of scorer ....

EXPLANATORY NOTES ON SCORE-CARD.

Trueness to Type.—10 points.

The ten ears in the sample should possess similar or like characteristics and should be true to the variety they represent.

Shape of Ear.—10 points.

The shape of the ear should conform to the variety type. The ear should be full and strong in the central portion and not taper too rapidly towards the tip. A full strong ear indicates strong constitution and good yield.

Color of Kernels.—5 points.

The color of the grain should be true to the variety and free from mixture. Differences in shade of color such as light or dark red, white or cream color must be scored according to the variety characteristics.

Color of Cob.—5 points.

An ear with a white cob in yellow corn, or red cob in a white corn should be disqualified, or marked zero, except in the case of White Cap Yellow Dent which may have either a white or red cob. This mixture reduces the value of the corn for seed purposes. It indicates lack of purity and tends towards a too wide variation in time of maturity, size and shape of kernels, etc.

Vitality, or Seed Condition.—15 points.

Seed corn should present a healthy, vigorous appearance and give evidence of being capable of producing strong, vigorous growth and high yield. Starchy, immature or pointed kernels are objectionable, as are also kernels with chaff or cob adhering to the tip, or kernels from which the tip cap has been removed, exposing the black covering of the germ. Blistered germs and shrunken blistered backs are the strongest evidences of impaired vitality.

Tips of Ears.—5 points.

In form the tip should be regular and the kernels uniform in shape and size. The proportion of tip covered or filled must be considerable. Long, pointed tips as well as blunt, flattened or double tips are objectionable.

Butts of Ears.—5 points.

The rows of kernels should extend in regular order over the butt, leaving a deep depression when the shank is removed. Open and swelled butts, depressed and flat butts with flattened, glazed kernels are not desirable.

Uniformity and Shape of Kernels.—15 points.

The kernels should be uniform in size and shape, making it possible to secure uniformity in dropping with the planter. The kernels should be not only uniform on the individual ear but also uniform with each ear in the sample. They should also be uniform in color and true to variety type. The kernels should be so shaped as to touch from tip to crown. The tip portion of the kernel is rich in protein and oil, and hence of high feeding value. Kernels with a large germ insure a strong, vigorous growth as well as richness in quality of the kernel.

Length of Ear.—5 points.

The length of ear varies according to variety type, and the characteristics sought for by the individual breeders. Uniformity in length is to be sought for in a sample, and a sample giving even length of ears should score higher than one that varies, even if it be within the limits. Very long ears are undesirable because they usually have poor butts and tips, broad shallow kernels, and hence a low proportion of corn to the cob.

Circumference of Ear.—5 points.

The circumference of the ear should be in symmetry with its length. An ear too great in circumference to its length is generally slow in maturing, and too frequently results in soft corn. Measure the circumference at one-third the distance from the butt to tip of the ear.

Furrows Between Rows.—5 points.

The furrows between rows of kernels should be of sufficient size to permit the corn to dry out readily, but not so large as to lose in proportion of corn to cob.

Space Between Tips of Kernels at Cob.—5 points.

This is very objectionable, as it indicates immaturity, weak constitution and poor feeding value.

Proportion of Corn to Cob.—10 points.

The proportion of corn is determined by weight. Depth of kernels, size of cob, maturity, furrows and space at cob all affect the proportion. In determining the proportion of corn to cob weigh and shell every alternate ear in the exhibit. Weigh the cobs and subtract from the weight of ears, which will give weight of corn. Divide the weight of corn by the total weight of ears which will give the percentage of corn. The percentage of corn should be from 85 to 86. For each per cent. short of standard a cut of one to one and a half points should be made.

QUESTIONS AND ANSWERS.

In the open conferences following the morning classes in judging, the following, among other questions, were asked:

Q.—How does this year's exhibit compare with last year's?

A.—Very favorably. The number of entries is much larger but the quality is not so good owing to the unfavorable season. A most gratifying improvement has been made in the selection of samples over those shown in 1909.

Q.—What variety is most popular for ensilage in Eastern Ontario and Quebec?

A.—Among flints, Longfellow, North Dakota and Compton's Early are perhaps the most generally grown. Early Leaming, Mastodon and White Cap Yellow are very popular dents. In our trials, Howie and Lenocher's Red have given good results, but these varieties are not widely known. Generally speaking, large growers do not confine themselves to any one variety. By planting Longfellow, Early Leaming and Mastodon they are assured of good ensilage even in the most unfavorable seasons. These corns ripen in the order given, so that the farther north and east we go the larger is the proportion of Longfellow used. Personally I think the less Mastodon grown in Eastern Ontario and Quebec the better. This corn gives an immense tonnage but the quality is generally poor. I think better results would be obtained if White Cap Yellow Dent or Howie were substituted for it.

Q.—How about White Cap Yellow Dent?

A.—White Cap has given splendid results, especially the smaller strains. Some of the large strains are too late for general growing. The principal objection I have to White Cap is its tendency to lodge and blow over. This is particularly marked where the corn has been planted thickly, and as the majority of our dairymen are generous in their use of seed, difficulty is sometimes experienced in cutting this variety. Notwithstanding this defect, White Cap is in the front rank as an ensilage corn.

Q.—What is the correct color of cob in White Cap Yellow Dent?

A.—White Cap being a variety which possesses blood of a white corn as well as of yellow, will naturally lack stability in color of cob. It is desirable, however, that the cobs in a given sample be either all red or all white.

Q.—How do you account for the fact that Leaming corn differs so widely in its time of ripening?

A.—Leaming is the oldest well-bred dent corn we have. It was first selected in 1826. Being a good yielding corn, and being well adapted to a wide range of soil and climatic conditions, many men have sought to adapt it to their conditions. The result is some strains of Leaming are very early while others are very late. This fact is becoming so well known that many growers are no longer satisfied to procure Leaming corn, but insist on having the strain of Leaming best suited to their requirements. For ensilage the Early Leaming is, over the greater part of Ontario, to be preferred to the Late Leaming.

Q.—How would it do to aim to get two small ears on a stalk instead of one large one?

A.—In dent corns I believe better results will be obtained if we confine our attention to stalks bearing but one ear. When we have done more to perfect our corn in other regards we may then more profitably direct attention to the production of two-ear stalks. It should be borne in mind, however, that two small ears per stalk, while probably giving a larger yield, would necessitate more work in husking and subsequent handling, so that the gain in yield would probably be largely offset by the extra cost of production.

Q.—What relation does the dent sustain to the depth of kernel and time of maturing?

A.—With kernels of the same width and thickness, the rougher the crown the longer is the grain as a rule, and, with few exceptions, the longer the grain the later is the variety in maturing. Almost any deeply-dented corn will show a tendency to a less pronounced crease as one approaches the tip; while with ears having a dimpled dent, those at the tip are generally so round on the crown that they closely resemble flint types. If kernels are removed from the ear it will be seen that they decrease in length as the dent becomes less pronounced.

Q.—What kind of shank do you prefer?

A.—As a close relation exists between the shank and the cob, I prefer as small a shank as is consistent with strength. Long ones are objectionable, but short ones are equally to be guarded against as they cause the ear to stand too erect—a position which retards drying and tends to increase danger of injury from rain, frosts and birds. Some strains of Reid corn have shanks which are splendid examples of too fine breeding in this regard. So constricted have they become, because of the full round butt, that many of them are no longer able to support the ear. To such an extreme has this been carried that some object to these strains of Reid, especially in districts where the corn is husked in the standing fields, as the ears are apt to break off in late fall.

Q.—How do you prefer an ear borne?

A.—At the most convenient height for husking. Ears borne high on the stalk are generally late; those borne very low are small and early. In the dents, I prefer one which bends over gradually until the tip points downward. On such ears, when the husks open, the grain is still protected from the rain and from the direct rays of the sun—a position which is almost ideal for rapid drying out.

Q.—How many degrees of frost is necessary to injure corn?

A.—The more sappy the corn the fewer are the degrees of frost required to lower the vitality. I have seen perfectly dry corn come safely through a period when the thermometer dropped to 35 degrees below zero. That same corn, however, when green and sappy would probably not have stood more than five or six degrees. The influence of the water content of the grain in various parts of the ear is very apparent. The blocky kernels at the base are generally injured before the shallower but more exposed tip kernels, because of the fact that they are the last to dry out.

Q.—Will frozen corn germinate?

A.—Some maintain that frozen corn, if thawed out slowly at a low temperature will germinate, provided the grain has not been subjected to alternate freezing and thawing. I have not tried out this theory myself, but would advise giving it a wide berth. I know that altogether too much badly frozen corn is used by men who think their seed good, therefore I would not advise anyone to try that which he knows has been frozen. The Biblical injunction, "Avoid the very appearance of evil" is especially applicable here.

Q.—Which is preferable, corn cured in a fairly good circulation or in artificial heat.

A.—Heat and circulation are both essential. I would not use artificial heat if I could bring my corn through safely without it, as natural drying is the least dangerous and least expensive. If artificial heat must be resorted to, it should be-remembered that a free circulation is absolutely essential to carry off all exuded moisture rapidly else the corn will either mould or germinate. Unless exceptionally good facilities are afforded for ventilation, the temperature should not be raised much above normal living room heat. In large modern seed houses artificial heat is used only when it is absolutely necessary, as better results are obtained when the corn is allowed to dry out naturally. Kiln-dried corn, however, properly cured has an advantage over that dried in the ordinary way, in that it will withstand unfavorable conditions better.

Q.—Why do you insist on fancy points, such as straightness of rows, uniformity of kernels, etc.?

A.—To my mind these are not fancy points in the sense the questioner means. They are evidences of good breeding. As far as they go, they are simply other names for good seed corn. What we want to get in judging is the ear which gives greatest promise of producing the most corn of high quality the next season. Anything that contributes to that end is not a fancy point; it is a practical point of great utility.

Q.—Is there any difference in the time of ripening between plants produced from tip kernels and those taken from the butt?

A.—Very little, if any, so far as my observation goes. It is quite a common practice to use tip kernels in improving the stand, where for any reason it is thin. This is done on the assumption that stalks produced from tip kernels ripen in shorter time than those from butt kernels. As a rule the stalks from tip kernels are finer than those from other parts of the ear, but as to the actual time of maturing the difference is slight.

Q.—If you fail to plant butts and tips, won't your ears soon run out at the ends?

A.—It is not a question of planting butts and tips to get full ears; it is a matter of selection. We want ears well filled out at both ends, but if we pay undue attention to these points there is great danger of shortening our ears, and so losing scale in the most valuable part. As it is easier to find short ears well filled at the tips than to find long ones well covered over, good judgment must be exercised to establish and maintain a proper balance or relation between the ends and the central portion of the ear.

Q.—Does immature corn give as strong germination as mature corn?

A.—Frequently the percentage of immature grains which germinate is as high as that of mature corn. Other conditions being equal, the growth from the immature is not quite so vigorous as that from the normally developed, although the difference is much less marked than the appearance of the two samples of seed would indicate.

Q.—How long can corn be depended upon to retain its vitality?

A.—Best results are to be expected from corn of the preceding summer's growing unless the season has been unfavorable. When properly stored, seed corn will retain its vitality for years. Naturally it will remain vital longer if stored in the ear than if shelled. This past season I planted corn four years old and had a good stand. From the lack of vigor in the resulting plants it was evident, however, that the corn was at least a year too old. When proper care has not been exercised in harvesting and storing last season's seed, I am of the opinion that seed of the 1908 crop, if carefully handled, will prove the more profitable, although it may be a day or so longer in coming up.

Q.—Have you ever used any of the patent germinators?

A.—Yes; the one tested worked satisfactorily, but unless a man has a very large acreage I doubt if it would pay him to buy one. The one before you is simple and in practice has given good satisfaction.

Q.—Is it possible to have an ear with too little cob?

A.—It is. Here is an ear handed to me by Mr. Coatsworth this morning which illustrates the point exactly. This ear would probably shell 92 per cent. of corn. What has heretofore been a strong point in its favor will probably lead to its undoing, if the present system of selection is followed, just as continued selection of full butts in some strains of Reid's corn proved a decided detriment. There seems to be a proper proportion existing between corn and cob which, if overstepped at the expense of the cob, leads to constitutional weakness and consequent deterioration.

Q.—Which takes up moisture the more readily, the grain or the cob?

A.—We know the cob is the last to give off its moisture, for though the ear may be very loose through the loss of water in the kernels in the early stages of drying, it becomes compact and firm as soon as the cob dries and contracts. If once thoroughly dry I should say the cob would be the last to absorb moisture.

Q.—Does Stowell's Evergreen make a less rapid growth than the average dent corn, and is it more difficult to cure?

A.—Stowell's Evergreen has always been a vigorous grower with us. We have cured our own seeds for several years, but find that it requires more careful handling than many of the dent corns.

Q.—Which type of planter do you prefer, the edge-drop or the round-hole plate?

A.—For carefully graded corn the edge-drop will give the better satisfaction; if the sample is lacking in uniformity I prefer the round-hole plate. One reason for our low average yield of corn is the fact that we do not get a sufficiently uniform stand. This can be rectified only by paying closer attention to the grading of our corn, and then using that type of planter which will enable us to put into each hill the number of kernels we desire. A few years ago I made a test of graded and ungraded corn in edge-drop and round-hole plate planters. One hundred and sixteen good ears were used and eight thousand eight hundred checks or drops were counted. Each check was then planted in the field exactly as the planters had dropped the corn in the test. The results showed that with graded and ungraded corn, when the plates best adapted to each were used, the edge-drop plates gave 3.4 per cent. better stand than the round-hole plates, and the increase in yield from the use of the edge-drop plates was five and a half bushels per acre.

CROP ROTATIONS FOR CORN.

C. A. Zavitz, Professor of Field Husbandry, Agricultural College, Guelph.

Six hundred and eleven thousand, one hundred and thirty-five acres of land in Ontario were used for the cultivation of corn in 1909. Of this area, practically 42 per cent. was in the counties of Essex, Kent, Elgin, Middlesex, and Lambton. Essex had 13.5 per cent. of the total area used for corn, and 25 per cent. of the area devoted to corn for the production of ripened grain, and Kent had 12 per cent. of the total area and nearly 20 per cent. of the area used for the production of corn for husking. When we realize the important position which the corn crop occupies in the agriculture of the south-western part of Ontario, we can understand the value of the consideration of this crop in determining the most suitable rotation for the best results. The Secretary of the Ontario Corn Growers' Association has done well to bring this subject before the Convention for its consideration.

I hope every farmer present has given a good deal of thought in the planning of a suitable rotation of crops for his own farm, as it is one of the exceedingly important features of good husbandry. The best rotations are those which are the most suitable for individual farms. It is really a matter for each farmer to study out for himself, after taking many things into consideration. It is sometimes advisable for a man to have two or even three rotations for the different parts of his farm. It is, therefore, impossible to have any one rotation of crops that would be the most suitable for every part of Essex County, where there is a considerable variety in the soil, in the method of farming, etc. If this is true for Essex County, it is certainly true for the other counties in the south-western part of Ontario, and also for the rest of the Province which grows corn to a more limited extent. It is my object, therefore, to consider certain principles in connection with the rotation of crops and to make certain suggestions, after which I hope we will have a good discussion regarding the adaptability of certain rotations in furnishing the most desirable results.

ADVANTAGE OF A GOOD ROTATION. A properly planned rotation certainly has many advantages; such as, the distribution of labor throughout the year, the furnishing of a variety of crops, the lessening of the risk from heavy loss, the opportunity of keeping the land free from weeds and destructive insects and diseases, the improvement of the mechanical condition of the land, and the maintenance or improvement of the fertility of the soil. Different kinds of crops possess different characteristics; such as the length of their roots, the season of the year in which the growth takes place, the length of the time required for growth, the power of assimilating plant food, the amount of certain food constituents required, and the amount of residue left on the land in the form of roots, stubble, leaves, etc. These are all important factors which need to be taken into consideration in arranging the most suitable rotation for any particular farm.

CORN IN THE ROTATION. It is very important indeed to introduce a cultivated crop in the rotation. In many parts of Ontario, noxious weeds are becoming very troublesome. One of the best methods of keeping the land comparatively free from weeds is the use of a short rotation which has a cultivated crop. Thorough cultivation greatly increases the yields of the crops, helps to destroy both the weed seeds and the weeds themselves, and makes an excellent preparation of the land for the succeeding crop. Those sections of Ontario, therefore, which can grow corn to good advantage can make use of a most valuable crop in connection with their systems of rotation.

A LEGUMINOUS CROP IN THE ROTATION. While it is important to have a cultivated crop in the rotation, it is also exceedingly important to have a leguminous crop as well. The legumes, such as clover, peas, beans, etc., have the power by means of their root nodules of fixing the free atmospheric nitrogen and of utilizing it throughout the plants. As nitrogen is the most expensive of the plant food elements that the farmer has to buy, this power of the leguminous plants is of the utmost importance. Not only does the addition of the nitrogen secured in this way add to the value of the fodder produced, but it also has a marked influence in improving the fertility of the soil through the decay of the roots. In order to illustrate this point, I will refer to the results of experiments which we conducted at the Ontario Agricultural College at Guelph in the years 1900, 1902, and 1903, in which the comparative value of the sods of Common Red clover and Timothy were determined. After the crops were removed from the plots, the land containing the roots of these crops was plowed. On the sods of 1899, winter wheat was sown in the autumn of the same year; on those of 1901, barley was sown in the spring of 1902, and on those of 1902, corn was planted in the spring of 1903. The average yields of the crops produced per acre are shown in the following table:

Sod	1900 Winter Wheat	1902 Barley	1903 Corn
	Bushels	Bushels	Tons
Red Clover Sod..............	60.4	31.6	23.3
Timothy Sod................	42.1	19.7	17.9

In 1902 the test with Common Red clover and with Timothy sods was repeated four times under somewhat different conditions. Barley was sown on each of the eight plots in the spring of the year. The detailed results of yields per acre are very interesting, and are as follows:

Tests	Red Clover Sod	Timothy Sod
	Bushels	Bushels
Number 1..............................	25.3	13.4
" 2..............................	36.2	20.1
" 3..............................	31.7	19.6
" 4..............................	33.2	25.7

In comparing the mechanical conditions of the soil on which Common Red clover and Timothy had been grown, it was found that there was a marked difference resulting from the action of the roots of the different crops on the soil. The sod of the clover was loose and friable, and that of the Timothy was close and comparatively stiff or hard.

Where various leguminous crops, such as clover and peas can be grown so successfully as they can in Ontario, it is important that a leguminous crop should have a place in the rotation in practically all instances.

ROTATIONS. It is my intention to simply mention a couple of rotations and to leave the meeting to name others and to carry on the discussion.

A rotation which is used extensively on the Experimental Farm in connection with the Agricultural College at Guelph extends over four years, and is as follows: 1, corn; 2, small grains; 3 and 4, clover and timothy. The grass seed mixture used is Common Red clover, 6 lbs.; Alsike clover, 3 lbs., and Timothy, 4 lbs., making a total of 13 pounds of seed per acre. Usually the crop in the third year of the rotation is used as hay, and in the fourth year as pasture.

In Essex County I find there are about 91,000 acres of corn, potatoes, roots, and peas; 108,000 acres of small grains, and 101,000 acres of hay and pasture. As there are 82,708 acres of corn in the county, the most common rotation in Essex, therefore, might reasonably be one extending over three years and consisting of corn, small grains, and clover. This is a most valuable kind of a rotation, containing, as it does, practically all of the advantages of a rotation of the very highest type. There could, however, be many additions to and variations from this to meet various conditions arising from the kind of soil, the condition of the soil, the condition of the subsoil, the size of the farm, the kind of farming practised, the proximity to market, etc.

Q.—How does Timothy affect the soil that it degenerates it so much in one crop?

A.—I think there are two or three reasons. One is that it is a surface feeder—it simply feeds on the surface. Another is that it is a robber of the soil; it does nothing to the soil and it takes everything from it. Clover has two distinct features; one is that it sends its roots so deeply into the sub-soil that it gathers plant foods far beyond the surface and brings up the mineral matter, and the other is that it has the power to make use of the free nitrogen of the atmosphere. There are bacteria that must make use of the nitrogen just as we make use of the oxygen, and when they use the nitrogen it is conveyed through the whole plant. It has been proved beyond doubt that this bacteria has a wonderful influence in increasing the yield per acre, and we are not only drawing from the sub-soil but from the atmosphere. Only the legumes will do that, such as clover, peas, beans, alfalfa, vetches and crops of that kind. Corn, roots, timothy and the grains, except peas, will simply take the plant food already in the soil, and will draw nothing from the atmosphere.

CORN IMPROVEMENT.

PROF. C. G. WILLIAMS, WOOSTER, OHIO.

I count it a great honor to be called before you this afternoon to address you upon this subject.

When I left the Ohio Experimental Station yesterday forenoon, there was a fearful storm brewing, and my fellow members suggested that I had better go out and buy a fur overcoat before I went to Canada. I did not do so, but if I had done so I would have been in good company. The only difference I see here, as compared with a Northern Ohio audience, is a few more fur coats than we are in the habit of seeing. But I do not see that you need them any more here than we do in Ohio.

There are many things upon which the most of us would agree, and one of these things is the statement that there is a splendid chance for improvement in our corn crop. The average yield of the corn crop in the United States stands at 25 8/10 bushels per acre, this year's average—and I am talking of shelled corn—and that is a ten year average yield. For my own State, the average yield is 35 bushels to the acre, and the states of Illinois and Indiana were a bushel or so less, and Iowa some three bushels less. From these figures it would seem that there are plenty of chances for improvement, at least in the United States. I have not heard your official figures, but I dare say it is higher than ours in the corn belt. For I remember that New England with her careful rotation and tillage exceeds the prairies of the West in her yield per acre.

While my mission here is ostensibly to bring a little information to you, I expect to take back to Ohio more than I brought from there. It is not an unusual thing for us to go to Ontario for agricultural information and experiments, and occasionally for some other things. We have had your Professors Klinck, Day and Zavitz, and have gotten a whole lot of good from them.

It is my privilege this afternoon to call attention to some ways by which we may improve these crops. I cannot guarantee that my facts will apply in every instance to your conditions, I leave that to your judgment, but I bring to you some of the work of our Ohio Experimental Station. There are a great many ways in which we can improve this crop. One of the ways is to improve the fertility conditions, and the second is crop rotation.

I want, in the first place, to give you some facts relative to this point. At the Ohio Experimental Station for the past seventeen years, we have had a uniform tract of land upon which we have been growing corn in continuous culture. Corn after corn after corn for seventeen succeeding years, and a few rods away we have been growing corn in five years' rotation, corn, oats and wheat, clover and timothy.

I want to show you the difference in the production, in the yield of corn under these two systems of cropping. In the first place we used no fertilizer. These experiments were undertaken upon land that had been rented for twenty-five years before the station took charge of it, and you know what continuous renting does to land. Where we have been growing corn without any fertilizer continuously for seventeen years, during the first five years of continuous corn we averaged twenty-five bushels per acre. The second five year period it dropped to 16.8, and the third five year period it dropped to ten bushels—corn after corn, without any manure or fertilizer.

A few rods away from this work we had corn growing in the rotation of which I spoke still unfertilized. These plots have had no manure for seventeen years, and you note the yield is practically on the dead level for the whole period, 31 bushels per acre, but I expect after a time it will come down.

Some of you would wonder what would happen if in the continuous culture we had put back upon the farm each year manure. We did that on portions of these plots, using five tons of manure each year, and the yields the first five years were 45 bushels per acre, second five years 40, third five years 34.6. You see the five tons of manure won't save a crop, it is heading downward. To compare with that we will take 3.2 tons of manure applied only in five year rotation. In this five year rotation we do not apply the manure each year. We only put it on two crops of the five, the corn and the wheat; they get eight tons each year, sixteen tons for the five years. Look at the yield, we started off a little lower than in the continuous culture, showing probably that the land here was not quite as good. But look at the second year, we have advanced from 40 bushels to 49; look at the third year period from 49 to 50, going up instead of down. Where we depended upon the commercial fertilizer for the plant food, you note substantially the same result that we had in the use of manure.

ROTATION VS. CONTINUOUS CULTURE.

FIFTEEN YEARS' WORK WITH CORN.

System	Treatment	Yield per acre		
		1st 5-year period	2nd 5-year period	3rd 5-year period
		Bushels	Bushels	Bushels
Continuous	Unfertilized	25.3	16.8	10.4
Rotation (5 year)	Unfertilized	31.9	30.8	31.1
Continuous	5 T. manure	43.1	40.1	34.6
Rotation (5 year)	3.2 T. manure	40.7	49.5	59.8
Continuous	Com. fert.	38.9	39.1	28.0
Rotation (5 year)	Com. fert.	41.3	49.9	54.1
Rotation (3 year)	8 T. manure	Once in	three years	12-yr. av. 58.2
Rotation (3 year)	8 T. manure 320 lbs. acid phos.	Once in	three years	64.4
Rotation (3 year)	Unmanured			33.9

CORN YIELDS IN THE UNITED STATES.

Twenty years, 1870—1889, 25.6 bushels per acre.
Twenty years, 1890—1909, 24.9 bushels per acre.
Ten years, 1900—1909, 25.8 bushels per acre.

We do not recommend a five year rotation as ideal. We have secured better results with a shorter rotation. We have results here in the three year rotation of corn, wheat and clover. In these rotations eight tons of manure is applied once in three years, and that is giving a twelve year average yield of 58 bushels. These same eight tons of manure reinforced with 320 pounds of acid phosphate on twelve years' average yield has raised it from 58 to 64 bushels.

While manure is the best fertilizer it is not perfectly balanced. We have a surplus of nitrogen and potash in comparison with phosphorus and the general tendency of our farming is, of course, to remove the phosphorus. We grow wheat and sell it; wheat bran is largely phosphorus. We grow animals, and the phosphorus leaves the farm in the bones of the animals, and we cannot get the phosphorus back as we can the nitrogen with clover and other legumes. We have simply to buy the phosphorus and put it back.

I believe here is one chance for improving our corn yield; farming with more careful system of rotation. There is need enough for improvement. With this great discussion that we have had in the States for the last ten years, you would almost think we had doubled the corn yield. But when you get down to hard figures, gathered officially by the Government, we find that we have made very little improvement upon production. In the twenty years' average yield of corn in the States, from 1870 to 1889, 25.6 bushels. The next twenty years, to 1909, we actually produced a little less, and during the last ten years we have got back to where we were twenty years ago.

You have already heard the question of drainage and tillage discussed; these are two exceedingly important lines and I will not take them up again. But if I may judge of the lay of the land between here and Windsor, no other one line of improvement offers greater inducement to the people here than drainage. And the same thing is true in Ohio and we are buying tiles and getting good returns from them.

I want to call your attention next to the matter of getting busy in the spring and planting your corn on time. We have a great many people who are afraid they will plant the corn too early. It is possible, of course, to plant the corn too early, but where your land is tile drained and works up, as it will, a little earlier than if it was not tile drained I venture to say that there is ten acres planted too late, where there is one acre that suffers from being planted too early. We have been planting corn at our station weeks before any other person would think of planting corn. And then after ten days planting another plot side by side to see what effect this early or late planting has upon the yield, and I want to give you some figures along that line.

EARLY AND LATE PLANTING OF CORN.—Three-year Average Yields.

Date of Planting	Yield per acre. Bushels	Per cent. of Moisture	
		1909	1908
April 27—30	74.9	26.5	16.5
May 6—10	77.5	27.4	16.5
May 14—20	75.7	28.1	18.6
May 25—30	66.5	29.9	23.9
June 2—5	48.1	37.8	30.0

Of course this test will not apply to your conditions exactly, but the facts will. Our dates are probably a little earlier, still I am not so sure of that. These are three years' average yields of corn, planted 21st of April, gave us an average yield of 74.9, and the same sort of seed planted a little later has averaged a little more 77.5. Planted the middle of May it drops back to 75; planted 25th to 30th of May drops back to 66; planting June 2nd to 5th has averaged 48 bushels.

There are a whole lot of men within hailing distance of where this corn was planted, but they did not think of planting corn until June, and you can see what they are missing. I do not say but what June is all right for you here; you can think that over; but the average man plants too late. He is waiting until it gets warm, but the fact that it is warm on the 25th of May is no guarantee that it is going to be warm a week later. I would just as soon put a coat and a pair of mitts on a man and set him on the corn planter if the ground is in good condition and plant the corn. Supposing it gets frosted once in a great while; I would rather have corn frosted in May than in September.

I remember about three years ago we began planting it on the 5th of April; we had some nice warm weather and the corn came up about the 3rd or 4th of May. It stood six inches high. Then we had a genuine frost which froze the water ¾ of an inch thick, and you would almost have thought that corn was ruined, but if you had come round in a week after that frost, you would not have known it had ever been frozen. I do not mean that it was six inches high. It was two or three inches high, and as good a color and as thrifty as any corn we have ever had, and yielded just as much as corn that was not up to get the frost.

Q.—Did you cut the tops off?

A.—No, sir; did nothing at all; they died right off, and a new growth came on and it was all right.

Q.—Does it get ripe any sooner?

A.—Yes, when you weigh up your corn in the fall, what have you got in a bushel of corn? Forty pounds of cob and grain and a whole lot of water. I do not care how dry your corn is, there is a lot of water, and in immature corn there is a good deal more water than in ripened corn.

If you want to grow water, plant your corn any time. If you are after dry matter in your corn, plant as early as you can.

Another matter, our yields of corn depend very largely upon the number of plants which we have grown on an acre.

AVERAGE FOR FOUR YEARS, 1904, 1906, 1907, 1908.

No. of plants per		Average Weight of ears	Percent. of		Yield of shelled corn per acre	Pounds stover per	
Hill	Acre		Nubbins	Barren plants		Acre	Bushels of corn
1	3,555	.68	10.3	2.2	31.47	2,484	78.9
2	7,110	.621	15.8	2.4	50.26	3,390	67.4
3	10,665	.545	19.5	4.0	59.28	3,994	67.4
4	14,220	.463	28.4	7.4	61.95	4,495	72.6
5	17,775	.402	39.8	11.8	60.29	4,969	82.4

This was the average result of four years' work with different thicknesses of planting, and I want to call attention to the yield. Where we had one plant per hill we had a little over thirty bushels of shelled corn per acre. From two plants per hill we had 50 bushels, three plants per hill 60 bushels, four plants per hill 63 bushels, five plants per hill the total yield, dropped back, we had a very large portion of nubbins. The yield of corn fodder or stover, as we sometimes call it, varied of course. One plant per hill twenty-five hundred pounds, two plants three thousand pounds, three plants four thousand pounds, four plants four thousand five hundred pounds, five plants five thousand pounds. Of course the ears are larger and better looking with a thin planting. With one plant per hill there is not much tendency for the plants to be barren. We had more barrenness as we increased the stand, and when we struck four or five plants the barrenness increased at a fearful ratio.

Q.—Still you have more corn?

A.—Yes, four plants give us more edible corn than any other. If I were asked my opinion, I would have to say that it was about half way between three or four plants. Three plants per hill gives 10,665 per acre, four plants 14,000. I think we put in about twelve thousand plants per acre, and by having the hills three feet apart one way and forty-two inches the other and three plants to the hill, that will give us just about twelve thousand plants per acre.

Q.—For ensilage would you plant late so as to get enough water in it?

A.—I do not think there is any trouble about getting enough water in ensilage corn. I prefer to get it ahead and get the water dried out. There are a great many foolish ideas afloat in regard to ensilage. It is very seldom that corn is too dry to go into the silo after it has been cut.

Q.—If it has been frosted?

A.—I have put it in at the station when it had been frosted, and it kept nicely; there is lots of moisture in the stalk. The drier the ensilage is, the sweeter it will keep. Some of our people fill their silos the second time, and put in shock corn. In that case I would put in some water.

Q.—Would it not be better to get it a little too green than too ripe?

A.—I would like to see the man who could convince me that it was too ripe? We have gradually been putting it in riper and riper until our farmers are putting it in just about in a condition that they like to have it shocked up.

There are some things that have to be done again and again. They perish after using. You fertilize or manure your corn this year, but it is no sign that you will not have to do it again next year or in three or four years. Tile drainage once done ought to be done forever. There are few things that will help us in our crop production that are more permanent.

Half a century ago a man in the State of Pennsylvania, walking out into his wheat field, discovered a solitary plant that looked different to him than any other plant he had ever seen. He gathered that plant and multiplied it, and to-day all over the States and over Canada we are growing Fultz wheat—the wheat discovered by Abraham Fultz by chance. Once Fultz wheat, always Fultz wheat. And a number of bushels have been added to the wheat crop by that happy discovery. We can all improve the heredity of our plants, and the matter of better varieties is of much importance.

Now, when I suggested that some of us might improve our corn yield by getting better varieties, I want just to say that I am not thinking of sending a long way from home for these varieties.

We read in our farm paper about a man who won some three or four thousand dollars at the Corn Show in Omaha with the best ten ears of corn, and the farmers in Ohio are pretty apt to think that the only thing they have to do to duplicate his success is to get some of his corn, and hosts of them are sending to Indiana and Iowa for corn. That is the worst thing that the corn growers can do. Corn is not a crop that can be moved long distances like wheat and oats. So that when I suggested the fact that a variety would suit some of us, I meant that you should canvass the home country for these better varieties before you look elsewhere, and if you have to go some little distance from home, don't go for any considerable amount of seed, or you may reduce your yield and the quality of your produce.

The Corn Association of Ohio is doing a line of work that I want to mention right here. We have a great many local societies in different parts of the State, and in the past season we conducted some thirteen or fourteen variety tests of corn. We got the people of one-half dozen townships to send in the variety they were growing, and on an acre or two of ground we would have 42 to 50 different varieties of corn, and we did not fail in a single test to find variation in yields of these different varieties, running all the way from 30 to 80 to 90 bushels, and others as low as 30 to 40, these varieties being grown by different farmers in the immediate locality. I am speaking of shelled corn.

Some one spoke here this morning about the farmer being wedded to his own corn. You get these varieties together at a central point and hold a field meeting when the corn is ripe, and then you will find some farmers apologizing for their corn that happens to be at the bottom of the list; the season was bad or something.

It is a pretty good lesson. I have discovered that no matter how firmly wedded a man may be to his own variety, if there is another variety that yields him twice as much, he is usually willing to get a divorce from that variety to which he has been so long wedded.

I send over every year to Iowa and Illinois and Kansas for the best seed corn that can be sent to me, and we grow these varieties side by side, and I like to show them to the farmers as they come into our field meetings in August and September. It emphasizes the necessity of getting varieties that are adapted to the existing conditions. This last season the best Reid's Yellow Dent that Kansas could furnish us yielded 57 bushels. The best Reid's Yellow Dent that Illinois could furnish us yielded 62 bushels. We are a little nearer Illinois than Kansas. The best Reid's Yellow Dent that Southern Ohio could furnish us crept up to 70 bushels; that is still a little nearer home.

Our own Reid's that we have been breeding and selecting for ten years yielded 79 bushels. If I were making a score-card for the selection of seed corn I would put down adaptibility first, and I would give it 30 or more points out of the one hundred. That is what you want to think of—adaptability. I do not care how bright the ear, if it is not adapted to my farm you cannot give it to me; I do not want it. You are growing corn for the bushels of shelled corn you can get per acre.

Supposing you and I had the best variety of corn that could be had. What then? There is something more. A good many of you are, I suppose, in the dairy business. You have learned that the selection and breeding is not the only thing to be considered. Some of the poorest cows in this world are pure-bred scrubs, and it is the same in the plant world.

We had in our station barn two cows of the same breed that stood side by side. They consumed the same sort of feed, and within a few pounds the same amount of food during the year. When we balanced the books we found that one of them had made a net profit of $50 above her feed, while the other one had made only $5. The difference was in the individuals, and it is the individual that counts in this world.

Ears of corn are good or bad as the result of heredity or environment. You and I want the seed corn that is good, because of something it has inherited, if you please, rather than one that is good because it was made so by environment. I can take that ear of corn that sold for $150 last week, and I can plant it on the best land in Essex County, and will only grow measley nubbins from it. If you do not believe that put ten kernels in a hill and see what you get. It is environment that makes these prize ears of corn, nine times out of ten, and if you are going to take these prize ears and grow other prize ears from them, you will have to bank upon the environment you can give and not upon their heredity.

Right in the same corn I have gone into a plot that had one plant per hill, and I have selected 25 of the best ears that I could find in that plot, and I have gone to those plots where there were five plants in every hill, and I have selected 25 of the best hills I could find. In the following year I have planted these 25 best ears, which were 50 per cent. larger, side by side under the same identical conditions as the ears selected from this plot where there were five in a hill. Which do you suppose came out ahead? There was not a great deal of difference, but the ones from the five plants to the hill were ahead. They were not as large when planted. What made these ears small was because they were planted five in a hill, and what made the others large was the conditions of growth. If I had to select my seed corn where the corn was growing one plant per hill, or five plants per hill, I would prefer to select it where it was growing five plants per hill, and there is mighty good reason for it. Where corn is planted one plant per hill, almost any plant will produce a good ear, but where they are planted five plants to the hill it is only the very best and most vigorous that will come to the front. The corn is too thick, and nature has got to kill off some of them. Which is it going to kill off? The sturdy and best? That is not the way this world was brought to its present standpoint. It kills off the weaklings. If you will skim the cream from these two plots you will get the highest grade of heredity where you have the adverse conditions.

Q.—Don't you think three or four would be better than five?

A.—I have to say what I find to be the actual conditions. The Nebraska Station has been planting four or five kernels to the hill. I give you that for what it is worth. I do not say that you ought to go ahead and make these conditions. That is the principle that nature works on. I would never go below three; if I was to vary from that I would take a larger number.

Burbank, the great plant grower, has a way of weeding out his plants. He grows seedling potatoes. He will have a million seedlings, and he sows them broadcast as thick as the hair on a dog. He sets nature fighting there, and after the fight is over he picks out the winners. So you go into the Corn Show and pick out these fine looking ears, and they are fine, and you have some fine ones here. When you look at them ask that ear, "What made you so good?" That is what you want to know. If it is something that is inside of it, you cannot get too much for it. If it is something that is outside of it, it is not one-half or one hundredth part as valuable. There are some men, I am sorry to say, that are good because of something outside of them. On that account they are pretty hard to be bad. But you make the conditions favorable to be bad and they will be bad. There are men that can walk down a street when there are no saloons easy enough and not get any liquor; but let there be a dozen or twenty-five saloons on the street and it is a different matter.

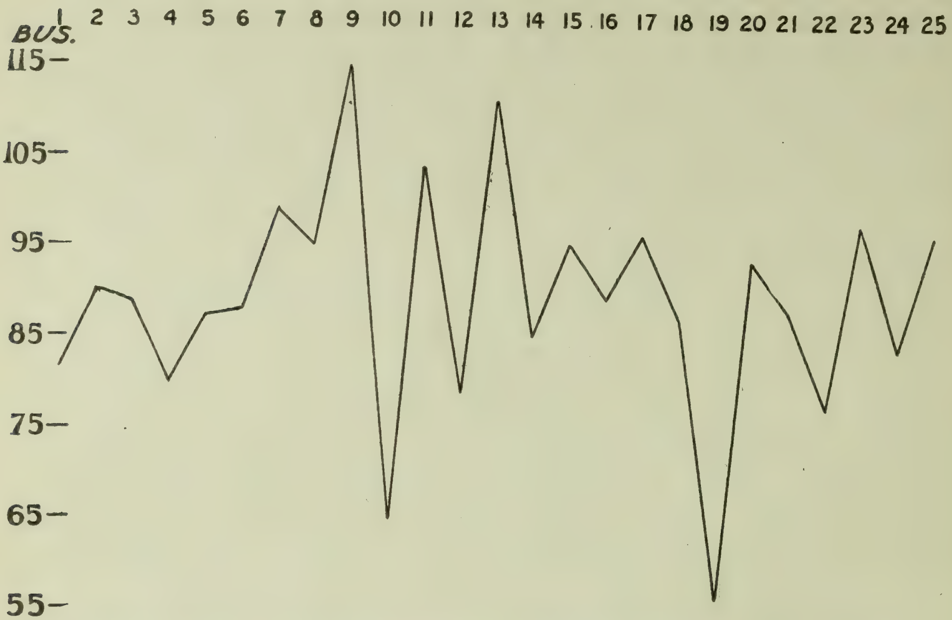
Inherited values in plants and animals are not easily discovered externally. We have much better dairy experts than we have corn experts. They have been working longer; and yet the best dairyman in America will miss it very often when he goes out to buy a cow. It is hard to discover these inherited values that are not on the outside.

What are our dairymen doing to-day? They are doing differently from what they were twenty-five years ago. Twenty-five years ago when a dairyman went to buy a cow he would run around to see how long her tail was, and then he would look in her ear to see how much wax there was in it, and then look at her face. But now they have come to the milk scales and the Babcock test, and that is what we are beginning to do in this corn breeding. "You look good, but are you good? We will plant you an ear to the row and see if you are good or not."

CORN BREEDING. I want to talk to you a little about corn breeding. I do not expect that you are all going home to put out an ear test of corn, but if three or four will do it a lot of good will be accomplished.

Here is a herd of twenty-five cows that have not been tested. We put them to the test and we find there is one that will make thirteen or eighteen pounds of butter a week, and they will run all the way down to five pounds. Here are twenty-five ears of corn. I do not care of what variety or what stamp of variety. We put them to the test, planting each ear three and a half feet apart, and what do they do? Exactly like the cows, they vary in just the same way; why I cannot tell you. I cannot tell you why the wife of one man here can bake good bread, while the wife of another man cannot. We find these variations in nature, even in children of the same family. One may get to be President of the United States and the other may land in the penitentiary. You cannot tell why it is, but it is your duty or mine to discover these superior individuals and make use of them.

Ear-row Test of Corn, 1905. (O.P.B.A. No. 17.)



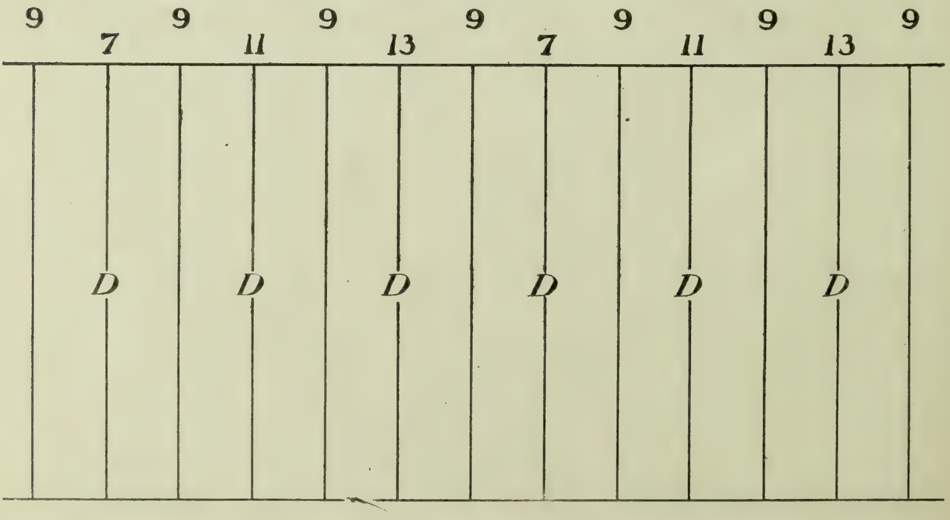
In 1906 the following ears were crossed in an isolated breeding plot: 17-9, 17-13, 17-11, 17-7.

The lines on this chart represent the ups and downs in the yield of 25 different ears of corn of the same variety planted side by side, and as a matter of fact were planted in duplicate, and this is an average of two sets of rows.

Here is one ear that yielded a little below 85 and then another 114. You would not get this in ordinary field conditions. In these tests we have a perfect stand.

Isolated Breeding Plot,

Where the remnants of the best ears of the preceding ear-row test are crossed.



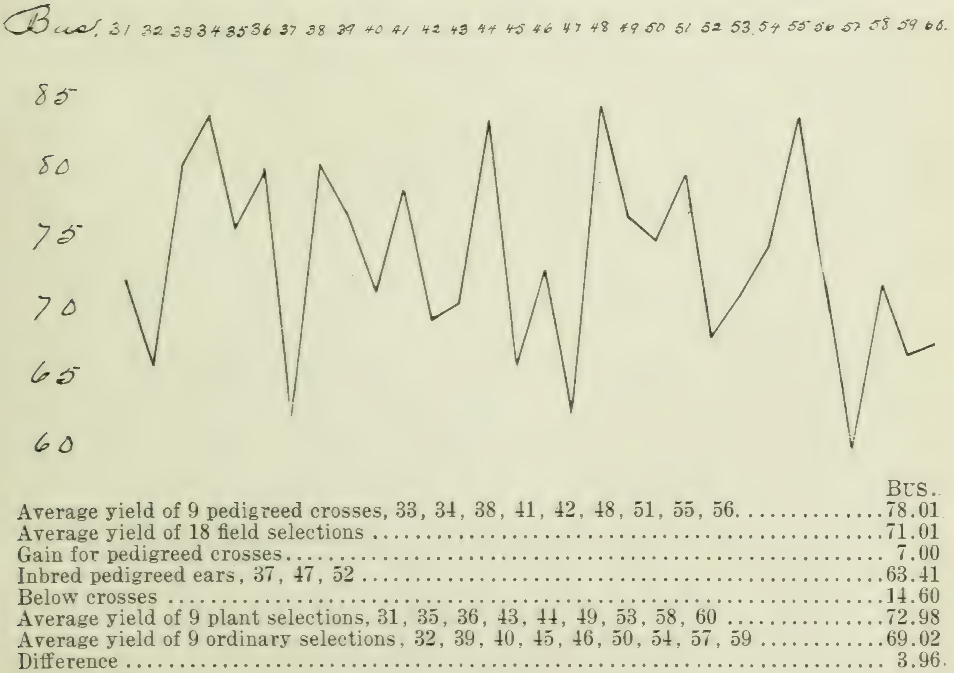
Q.—Which of these ears would you prefer?

A.—Number nine.

Q.—How many stalks in the hill?

A.—Three stalks in the hill. Right opposite number nine is the second poorest of the bunch, and the pollen would blow over, and we would get some of the blood of these very poor ears when we select corn from this row. Our practice is not to plant the entire ear in the spring; we plant part of it, and we number the ear so that we will not make any mistake. After it is completed and we have discovered which ears produce the best, we have some of the original ear, and we will take the left overs of these four best ears and start strains the following year. You can handle them in two ways. As a farmer I would take three or four best ears, shell them and mix them together, and plant them away from other fields, far enough to avoid pollenization and plant and perpetuate the blood of these three best ears. As an experimental Station, we prefer to be a little more accurate, and we will keep these ears separated. The second year, we plant them in a little patch in short rows, and we plant every other row with number nine. We are going to use that as the sire, and on the alternating rows between number nine rows, we will put these others—seven, eleven and thirteen—and then, when the tassels begin to come on, we will de-tassel all of these rows right through, except the number nines. Then, you see, by saving the seed of these de-tasseled rows, we get a direct cross between the two rows, and number nine will be the sire in every case. We will have a cross of nine on seven, nine on eleven, and nine on thirteen, so we have three distinct strains. As a farmer, I do not believe I would go to that trouble. We have a few farmers over in the States who are doing that, and one farmer has for two or three years been putting on the market, strains bred in this way, and he got $5 a bushel for the seed.

EAR-ROW TEST, 1907. AVERAGE BOTH PLOTS. (O.P.B.A. No. 54.)

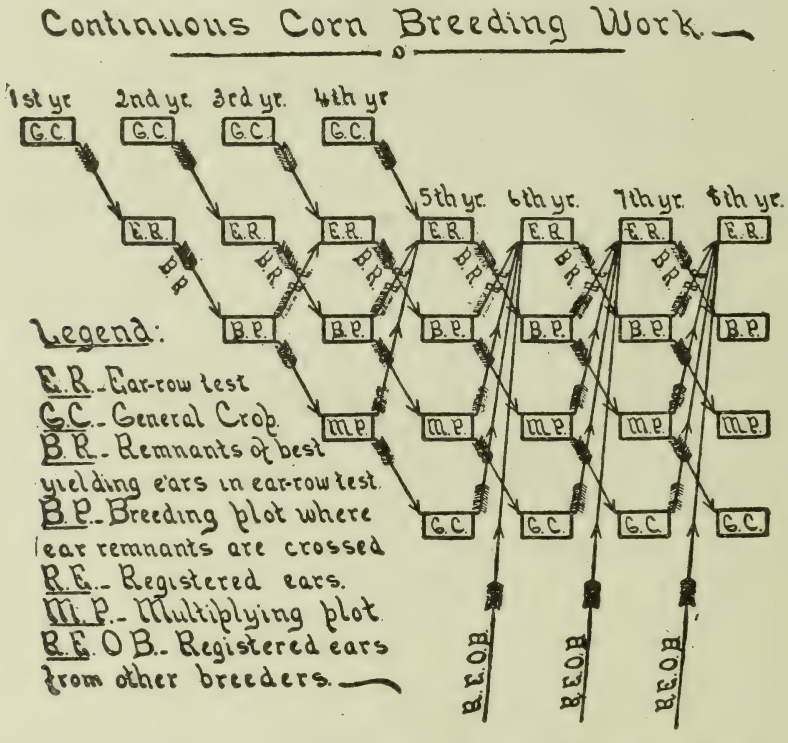


	Bus.
Average yield of 9 pedigreed crosses, 33, 34, 38, 41, 42, 48, 51, 55, 56	78.01
Average yield of 18 field selections	71.01
Gain for pedigreed crosses	7.00
Inbred pedigreed ears, 37, 47, 52	63.41
Below crosses	14.60
Average yield of 9 plant selections, 31, 35, 36, 43, 44, 49, 53, 58, 60	72.98
Average yield of 9 ordinary selections, 32, 39, 40, 45, 46, 50, 54, 57, 59	69.02
Difference	3.96

Q.—How far are these plots from the other corn?

A.—That will depend a little on the direction of the wind; our prevailing winds come from the west and south-west, and if the breeding plot was to the east and north-east of the field, I would want it at least eighty rods away.

In three years we will have a production of three different strains. I want to show you what they do in the third year. I planted some of this pedigreed seed in single row tests, as compared with better looking corn brought in from the field. We have not as large yields this year because it was a poor one. It is not the actual yield you go by in corn breeding, it is the comparative yield. I do not say that an ear must yield ninety bushels in a year, and I will save the ear that yields ninety bushels and throw the others away. Some good seasons you will save a lot of poor ears. The average of the nine pedigreed grains was seventy-eight; the average of the eighteen field selections was seventy-one, a gain for the pedigree strains of seven bushels.


Continuous Corn Breeding Work.
1st yr
2nd yr.
3rd yr.
4th yr
5th yr.
6th yr.
7th yr.
8th yr.
G.C.
E.R.
B.R.
B.P.
M.P.
R.E.O.B.
Legend:
E.R.-Ear-row test
G.C.-General Crop.
B.R.-Remnants of best yielding ears in ear-row test.
B.P.-Breeding plot where ear remnants are crossed
R.E.-Registered ears.
M.P.-Multiplying plot.
R.E.O.B.-Registered ears from other breeders.

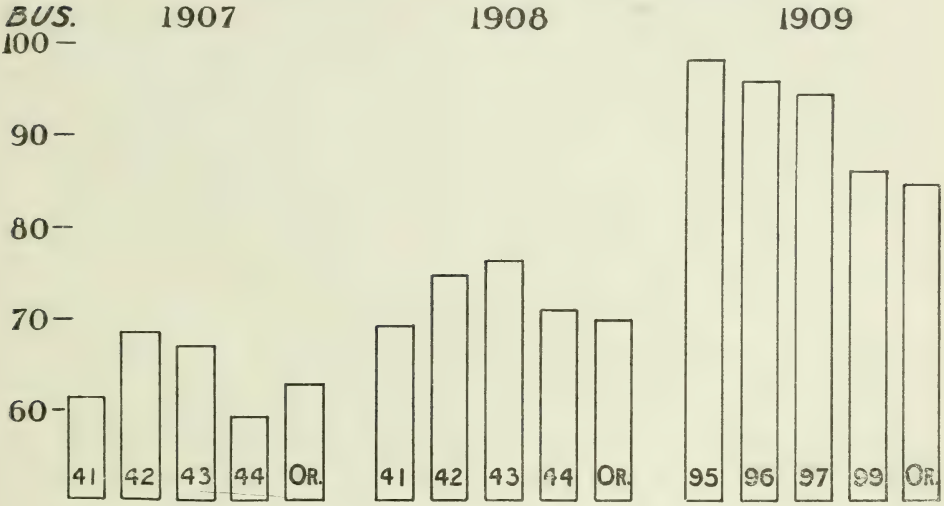
Q.—What have these pedigree strains been doing since that?

A.—That same year we took samples and tested them alongside of the original corn; the height of the column indicates the yield. You will find in plant breeding, the same as in animal breeding, that not all the animals that have good parents turn out to be good. A whole host of trotting bred animals cannot trot. The crosses are better than the original. In 1909 we had the grandchildren of these first ears that I showed you of 1905, and here is what we got. One of them came close to one hundred bushels of unshelled corn. The first generation we found results five to seven bushels ahead. The second generation twelve to fifteen bushels.

I do not think that we have any right to assume that we get our best corn in our first twenty-five or fifty ears. We have got to keep this up. The second year we generally get twenty-five ears more, and conduct another test, and then go to another breeding plot and another multiplying plot. We keep that up year after year. We get the best test from the pedigreed corn, which gets better and better all the while. We are getting registered ears from other breeds, and if one is good enough the next year it goes into our breeding plot, and I will use it as the sire.

Plants may be improved by improving their surroundings—that is, the condition in which they are grown, and by improving their heredity. What you get as a result of better breeding does not cost you much.

TENTH-ACRE PLOT TEST OF PEDIGREED STRAINS.



41 = 17 - 9 × 17 - 7
42 = 17 - 9 × 17 - 11
43 = 17 - 9 × 17 - 13
44 = 17 - 9 × 17 - 9

54 - 34 = 1 ear of 43
54 - 48 = 1 ear of 42
54 - 55 = 1 ear of 43

95 = 54 - 44 × 54 - 34
96 = 54 - 44 × 54 - 48
97 = 54 - 44 × 54 - 55
99 = 54 - 44 × 54 - 44

THE PRODUCTION AND REGISTRATION OF HIGHLY-BRED SEED CORN.

L. H. NEWMAN, SECRETARY C.S.G.A., OTTAWA.

As one who is deeply interested in the production of seed corn, I appreciate this opportunity of meeting so many members of the Ontario Corn Growers' Association and others who are interested in this great question of corn improvement. We meet here to-day with enthusiasm. Many of us have come to realize the possibilities which lie within the reach of men to get more useful plants, and we have met here to increase our knowledge and to strengthen our convictions. The great forerunner of any achievement worth while is enthusiasm. Where enthusiasm is lacking, the power is stopped and stunted, and we are likely to make very little progress. The Ontario Corn Growers' Association is fortunate in having among its members so many enthusiastic growers, who appreciate something of the possibilities of better methods, and who realize that the full producing power of an acre on the average farm has not yet reached its limit, or nearly reached its limit. I read in your report that the main object of your Association is to encourage the extension of the area devoted to corn growing, and also to encourage a greater interest in the matter of seed corn growing generally. Such a movement is commendable, and speaks well for the statesmanship of its members. You have in the Counties of Essex and Kent approximately 158,000 acres devoted to the growing of corn. This year, I believe, your yield was a little better than seventy-five bushels to the acre, although some years would be perhaps a little higher. This yield is not what it ought to be were better methods of cultivation and better systems of drainage and better seed corn brought into active service. As an Association you have had it in your power to improve conditions in this section of the country, by encouraging your growers generally to adopt better methods.

I wish to speak more particularly of the work of the Canadian Seed Growers' Association, and I also wish to say a word on the methods of registering seed. While many of you are no doubt acquainted with the aims and objects of this Association, there may be others who are not so familiar with them, and for the sake of the latter I wish to state, as briefly and as clearly as I can, the exact position occupied by this Association in Canada. I also wish to define the relationship which exists between the Ontario Corn Growers' and the Canadian Seed Growers' Association. Since some of you may be inclined to say that the work of our Association duplicates that of the other, with the very first word I wish to dispel from your minds any such idea. The Canadian Seed Growers' Association is an organization covering the whole of Canada, and embracing all crops, including corn, and requiring of its members certain definite work which requires that a system of breeding be followed, which system, in the case of corn, is one which is recommended for the use of all corn growers, whether members of our Association or not, and one which is identical in all essential particulars with the system that your Association recommends. The Canadian Seed Growers' Association keeps a careful record of the work performed by its members, and in the course of time issues certificates of registration for seed which has been grown in this manner, no matter whether this seed be wheat, oats, barley or corn. It also inspects the work of these members during the growing season, and aims to instruct by personal visitation the various members engaged in the work and try to instruct them in better methods of corn growing generally. As a registration for plants, it corresponds with that which has been in use in Canada for registering animals. As a good many of you know, practically all pure-bred animals of all good breeds in all the Provinces are registered at a central point in the Dominion at Ottawa. Such an arrangement gives greater unformity and stability to live-stock breeding in Canada as a whole. The seed which comes from the plants which have been grown according to our directions are also registered at the headquarters of the Canadian Seed Growers' Association, which is under the jurisdiction and direction of a Board of Directors chosen from all the Provinces. These records, or these certificates, are essentially national in character, and are accepted by buyers of seed in all the Provinces, and are recognized as valuable by buyers of seed in any country in the world which up to the present time have come to us for such seed. We welcome all such movements as that which has been championed by your Association here, as preparing the ground for the more systematic work required by us. We expect that the interest which you will create through your meeting, exhibition and the like will stimulate many to go on a little further and take up the systematic work leading to the registration of their seed. Your facilities in interesting the ordinary grower are admirable, and you will no doubt create an interest in this matter in local centres throughout these counties. To put the matter more clearly, any corn grower may become a member of the Canadian Seed Growers' Association and a member of the Corn Growers' Association, and may reap the benefits of the Association without in any way reducing the usefulness of either.

These two Associations may work side by side and hand in hand, with the closest co-operation and to their mutual advantage, and to the advantage of the corn grower who is fortunate enough to be a member of each.

In beginning the work of corn improvement, the first important consideration is that of variety. We find at the present time that the most of our varieties of corn are very badly mixed. We find that there is a great multiplicity of types. The same thing is evident in wheat, oats and barley, but not to the same extent, because corn is a cross-fertilized plant, and when we speak of the variety of corn we really mean the general crop, in which the prevailing type may be defined in general terms. In the report of the meeting held here a year ago, Professor Zavitz, of Guelph, dealt quite fully with this matter of variety, and pointed out the importance of making careful choice, so that I shall not need to go into it further, other than to recommend that you study it very carefully.

Systems of corn breeding which have been adopted in North America differ considerably in methods of procedure, but all recognize, with a few exceptions, the same general principles.

The system in use in Canada by the Canadian Seed Growers' Association is somewhat simpler than the majority of those recognized by our friends across the line, and for that reason the greater number or proportion of corn growers adopt that system, and it seems to be accomplishing the object for which it was intended, and that is the final test of any system. The basis upon which the Canadian Seed Growers' Association established its system is on what we call the ear to the row test, that is, we have a special breeding plot, on which each single row is planted with corn from the single ear. There is the accumulated evidence of some twelve or fifteen years to prove that the productive capacity of single ears of corn differs very widely in a great many cases. Some ears will produce 50 per cent., and even more, than others will produce. The aim of the corn grower is to isolate these best producing ears, and that can only be done by some system of breeding. The idea that because an ear appears good it will give good results is liable to be a delusion and to create a disappointment. The quality or virtues of an ear of corn depends upon two things. First of all, it depends upon the condition under which the plant which produced that ear was grown. Secondly, it depends upon the breeding of that plant. It may sometimes happen, and doubtless it has often happened, that a poor plant produces an ear which appears good, but is forced to do so by extra fertilization or extra moisture. But it is not desirable that that ear should be used for seed purposes, because we find these acquired virtues are not likely to be transmitted to offspring grown under normal conditions, so that you will see the only safe place to select corn is from the growing plant. The Association recommends that the breeding plot be used to facilitate the discovery of these valuable ears. We recommend a plot of not less than twenty rows in number, with fifty hills in each row, each of these rows to be planted with corn from a single ear. In preparing this plot we should select probably about twenty of the best appearing ears we can find. When the stalks begin to tassel, the corn grower is advised to go through the plot and examine the different plants carefully for scrubs, mongrels, and degenerates, and remove the tassels from these before they show their pollen. Our aim in doing this is to insure a strong, vigorous parentage for the ears which we will use next year for seed. By removing the tassels from the male plant on your plot, you prevent their fertilizing the plants which otherwise would produce good ears. That leaves the parentage strong, healthy and vigorous.

This process, when continued for a number of years, will repay the breeder by increasing the yield and reducing the percentage of nubbins and by reducing the percentage of barren plants. We can give you many instances where we have accomplished results along this line. The Association recommends that careful record be taken of the performance of these individual rows, but we do not require that work to be done, because it necessitates a great deal of extra work, but we feel that it would pay a grower to do it. In the first place, it is one of the very best trainings he can possibly have in the importance of close observation and examination of details. If he does not take these careful notes he is likely to pass over a great many very important points, so that we invariably encourage them to do it; and, on the other hand, it assists us at headquarters in establishing a degree of greater merit than we can establish were these reports not taken. In taking up this work it is desirable that you adopt some system of recording the performances of these rows, and to facilitate that, we issue special forms, which may be used in taking these notes. One form is sent into headquarters and the other form is kept by the grower for future reference. In selecting for next year's breeding plot we advise that 40 or 50 of the best ears be chosen, and in selecting these, rather than select from 2 or 3 of the best, we advise selecting from between 5 and 10 of the best rows. If you are going into this with the view of registering seed corn, we recommend that these be laid away to plant next year in the usual way on a plot which is isolated from other varieties. Corn cross-fertilizes for a considerable distance, and it is very important that these plants be kept away from fields of other varieties, and that is one of our greatest difficulties in this work to insure that the producing plant be maintained in purity. Sometimes growers exercise every precaution to have their plants isolated, only to have their efforts frustrated by their neighbours planting some other variety alongside of it. This difficulty can be overcome by means which I shall not take time to describe. That is a matter that can be taken up with the individual grower

There are two or three things which should be observed in selecting seed corn. In the first place, ears which are too large, especially in the dent varieties, should not be chosen. Ears exceeding 9½ to 10 inches in length and more than 7 inches in circumference should be passed over. No ears should be taken from a plant which shows an indication to produce more than two ears.

I would like to take you with me on a little tour of inspection I made through this country last summer, in judging seed plots and fields entered in the field competition. In all, there were 73 individual plots or fields inspected, and a great many careful notes were taken on each inspection, because it was not only my intention to judge and place the awards in the competition, but I wished to get as much information as I could from the growing crops.

You have here at your exhibition an excellent exhibit, one which you may well feel proud of, but that represents the cream of your crop, it does not represent what you would call the average of your crop. There are a few things that I came across this summer, which, I think, it would be of value for you to know. In discussing the standing of the fields of corn grown in Essex or Kent, it is only fair to state, in the beginning, that the standing of these crops is not what it would have been in a normal year. The late cold spring kept the planting two weeks or a month behind, and as a result, a great deal of the corn did not mature thoroughly, while crops grown on tile-drained soil were really more desirable and more satisfactory in general standing, and even here the crop was not what it would have been in a normal year. These, however, are conditions over which the average corn growers have very little control. There are difficulties which may be controlled to a very great extent, and I shall speak of them more particularly. I refer specially to impurity of varieties and lack of uniformity in type. It is safe to say that the majority of corn growers throughout this country realize the importance of purity, and they have done all they possibly could to insure purity; but, as I said before, the grower is often frustrated by the growing of corn by neighbours. On the other hand, it is perhaps quite safe to say that a good many growers do not regard mixing of corn as a menace to a successful growing method. In fact, I have been told by growers that they intend mixing varieties, with the idea that they would secure larger yields. The practice of mixing corn in this way is sure to develop a greater multiplicity of type than it already possesses. We have already sufficient mixture, and it is desirable, therefore, that we should try and get a variety as pure as possible, because the crop is likely to mature more evenly, and one of the great difficulties of uniformity in maturing is due a great deal to mixing different types. Some types mature perfectly when others are in the milk stage, so that when varieties are allowed to mix, you are simply inviting lack of maturity in your corn crop. Furthermore, this is a very undesirable and a very unsafe practice, to think of selecting seed corn from a field which has been mixed in this way.

Regarding uniformity of type, it was found that many fields were made up of a great many different types, thus indicating that the choice of seed is not receiving the attention that its merit demands. As an instance of this I found one field of corn said to be Leaming, containing at least three distinct types which would differ in yield quite as much as different varieties of wheat, oats or barley, which would naturally be expected to mature in this field. but some of the earlier types of corn were well matured, and some of the late were still in the milk.

In many fields of White Cap I also found a great diversity of type. I found a very great difference in the way the different types were maturing. There was a lack of uniformity in maturing. In the White Cap Yellow Dent I found a great many fields in which there are white cobs or red cobs; you should select them for one or the other. Some men have the impression that a red cob would produce a greater yield than the white cob, and they had selected with this idea in view. The percentage of barren plants found throughout these fields was not nearly so large as I expected, but the percentage of nubbin-producing plants was as high as between sixty and seventy per cent. of nubbins. This was due to the season. I found fields where the prevailing type did not grow too large, and consequently they had the smallest percentage of nubbins and the largest estimated yield. In certain breeding patches I found that some growers were not accomplishing what they hoped to accomplish. In one particular case of a grower in this country, who imagined that by getting a very large ear he would increase the productive capacity of his type, the result was that I found this year the prevailing number of rows of kernels in the type he was selecting was from 20 to 22. An ear of that sort is too large, and is borne too high on the stalk, and is a material hindrance to the harvesting of that crop with a machine. This is not the most important point. The point is that such an ear is too late in maturing. The general products of a plot of that kind did not mature fully this year. This particular grower was also selecting from plants which had a tendency to produce two ears; the result was that I found twenty-seven per cent. of the plants he had planted producing, or trying to produce, two ears of corn, but the ears that were being produced were of a very undesirable type and borne very high on the stalk. An interesting fact in connection with this work is that this grower whose work I have just cited got his seed originally from another grower two or three years ago, who has also been selecting from his breeding plot, and he selects from a smaller ear, and selects only from plants producing one or two ears which are borne lower on the stalks, and selects ears with no more than eighteen rows. This year I found his corn was maturing perfectly; he had only fourteen per cent. of stalks on his plot that were trying to produce two ears of corn. Any attempt at short cuts to larger yields by selecting very large ears from stalks which produce more than one ear is a dangerous practice in the case of the dent varieties. Happily, this fact seems to be generally known throughout the corn-growing sections, and we do not find the evils of false ideas throughout the counties devoted to corn to the same extent that we do in other places. The variation in yield between rows of corn in breeding plots was found to be considerable in the plots of corn by some of our best growers. We found the difference in yield to be one-third less than yields in other rows, and that these rows were planted with ears which looked alike and which had been selected in the same way. The idea of the breeder is to isolate the best ears, and once he has them isolated he can then continue selecting in such a way as to keep up his yields according to the condition of his soil, etc., and keep the variety from degenerating.

The counties of Elgin, Essex, and Kent produce more than half of the husked corn of the whole Province, therefore this part of Ontario will always be the main source of seed corn of these varieties for this Province.

The opportunities for specializing along this particular work by practical corn growers, growing an article which will register under our regulations, are abundant, and we recommend that the corn growers generally take up this sort of work, going into it systematically with a view of ultimately having their seed registered, and realizing the advantages of this sort of work. There are at present a great many good corn growers in this country, and I found last year some excellent growers who are growing a splendid article, and they are offering it for seed, but their work is very little known. They are working in comparative isolation. Our Association is trying to do what it can to discover the best corn growers, and to encourage them to affiliate themselves with us and adopt our system, so that we will be in a position to vouch for the quality of the seed they are producing and give them the public recognition which they deserve. The seed is not distributed to the advantage of the growers, and certainly is not distributed to the best interests of the country as a whole. Therefore, you will see the place this Association occupies in encouraging these good growers to associate themselves in a combined effort to increase and improve the corn-growing situation generally. I need not point out the advantage of this procedure. The demand for seed corn at the present time is very substantial, and there is a growing demand all over Ontario for a high-class article. The shrewd buyer at the present time is looking for seed corn that has been grown under some special system, and that can be certified to, or vouched for, by some institution or organization which has the confidence of the public as a whole. These buyers are looking to secure the seed on the ear, because they understand full well that, where corn is supplied in that way, the grower cannot throw in nubbins and undesirable seed. They must supply a reasonably good type of ear, and they prefer to get it on the cob, in order that they may keep it to the last possible moment before planting, because corn acts very much better in that way.

In closing I would like to summarize three or four points, and the first is, that it will pay any grower who grows corn in any considerable quantity to operate a seed plot in some part of a field. Whether he is a member of any association or not, it will pay him to do this in order to maintain the purity of the varieties, and in order that he may eliminate a good many of those undesirable types, and therefore insure more uniformity in the maturity of the product.

Second. Another point is that he should aim to develop pure strains, a uniform type, and have every stalk in his plot producing a desirable type of ear.

Third. There is an opportunity of extending your work as corn growers by specializing and taking up the growing of seed corn systematically.

Fourth. That certificates of registration be issued in the course of time to members of our Association who are growing seed of any sort, who have grown the seed according to our directions, and who have built up standards of these types to comply with the regulations as at present laid down.

Fifth. Certificates are valuable as an assurance to the buyer of seed corn as to the quality of seed he is getting.

Sixth. In this great movement of corn improvement the Ontario Corn Growers' Association has a great work to do in instructing growers generally as to proper methods. And my last word would be to give this movement the greatest possible support.

Seventh. That the Canadian Seed Growers' Association can co-operate with the Ontario Association, and with all associations and movements which tend to improve the conditions of corn growing, and make the business a more profitable one.

It is to be hoped that the germs of improvement which are being scattered, particularly at the present time, will infect and spread, and that a great many corn growers will not only be better corn growers, but will become corn breeders in the fullest sense of the term.

I wish the Ontario Corn Growers' Association, and the great cause which it seeks to advance, every success.

TILE DRAINAGE AS A FACTOR IN CORN GROWING.

PROF. W. H. DAY, O.A.C., GUELPH.

It affords me a great deal of pleasure to come to Essex to talk to the visitors at the Corn Show and the delegates of the Clay Workers' Association on the subject of drainage, which, as you all know, is a subject which has become a part of my life during the past few years. I do not now talk on the subject of drainage the way I did five years ago. I was brought up on a farm in the County of Victoria, and we knew what it meant to see a field, that would not grow more than a quarter of a crop, turned into a field that would grow a bumper crop of anything. And I thought five years ago, when I first began to talk drainage, that the people knew the benefits of drainage as I knew them myself; but after five years of experience, coming in contact with people in all parts of the Province, I have come to the conclusion that the benefits of drainage are not thoroughly known by the people. Some of the people are very much alive to the benefits, but others are not so much so. I think perhaps there is no part of the Province where the majority of the people need to have the benefits of drainage manifested more than in this County of Essex. I know there are a large number of farmers who are actively engaged in draining their farms, but there is a large proportion of the people who do not know the actual benefit of drainage. For five years we have been making drainage surveys in various parts of the Province. Any man who has a difficult drainage problem to solve may have the assistance of one of the drainage officers, who will make a survey of his land and lay out a plan, and tell him how much grade he has to the hundred feet. This will be done if you will make application, and all you have to pay is the travelling expenses of that man from the College to your place; and if two or three surveys are made at the same time, then the expense is divided up. For five years we have been making these drainage surveys, and until last spring we apparently had very little at the College to show for our labours. But in the spring of 1909 I wrote to every man for whom we had made drainage surveys in years gone by, and put these questions to him: "Have you put in any of your tile, and, if you have done so, will you kindly write and tell us your experience? Tell us how much it cost you, and tell us how many bushels per acre you got, and send us some samples of the grain, to show how the crops are growing." And a large number of these people wrote back and sent us reports, and I am going to begin talking on the benefits of drainage to-day by letting these people talk, by letting the men who put in the drains say a few words to you. I will just take them alphabetically.

WILLIAM BELL, Washago, Simcoe: "I drained eight acres you surveyed for me in 1907. It had produced nothing previously. Last year I grew a fairly good crop of oats on it, which yielded 33 bushels per acre. Following is a statement of outlay and results:

"*Cost* of draining 8 acres, $290.90—$35.11 per acre, including a 6-inch main to drain other land as well as this.

"*Returns*—33 bushels oats at 45 cents—$118.80, nearly half the cost of drainage."

Then we have not counted anything for the straw, and straw is worth something, and if your market here is like it is in Guelph, you can sell a ton of straw for $8. This man would get a ton of straw per acre; that would be $4 more to be added, which would make $150 off ground which never grew much of anything before.

J. H. CLARE, Chapman, Hastings: "Fields that previously were unfit for crops at all can now be seeded on even date with high land; and, while before they grew nothing but coarse grass, now they yield per acre: Hay, 2 to 3 tons; oats, 40 to 50 bushels; barley, 30 to 50 bushels; corn, 14 feet high."

I have no doubt that some of you people know the example I am going to give you. There were twelve acres in this particular piece, but I am making it eight acres, so as to have a good comparison, because right across the fence there were eight acres undrained. I am going to take eight acres drained against eight undrained, a difference of $419 in favour of the land which was drained, nearly four times the cost of the drainage, from one crop.

JAMES CLAYTON, Cedar Springs, Kent: "In 1901 I drained 8 acres, at a cost of $112, or $14 per acre; 8 acres right across the fence was not drained. In 1902 both fields were sowed to beans; 8 acres drained land gave 302 bushels, which sold for $456; 8 acres undrained land gave 24 bushels, which sold for $37."

"Well," you say, "that is a bean crop. We are interested in corn." All right. In 1903 both of these fields grew fall wheat.

Now, if you people had 20 bushels of wheat to sell to-day, you would get about $22 for it, and half a ton of straw would make it up to $26. In 1904 there was drained land on both sides of the fence. The man on the other side could not stand it any longer; two crops were enough for him.

T. S. BIGGAR, Manager, Walker Sons, Walkerville, Essex: "On our drained land this year (1909) we had 80 bushels of shelled corn per acre, while the undrained gave us only 56 bushels. Of oats we had 66 bushels on drained and 37 on undrained. In 1908 the drained land gave us twice as much as the undrained. We have tilled 87 acres this year, and purpose tilling much more next year."

I will just give you the facts about a piece on the old homestead where I first got interested in drainage. My father, in writing the facts to me a little while ago, said this: "I drained a 10-acre field some fifteen years ago, at a total cost of $145, or $14.50 an acre, the drains being four rods apart and two and a half feet deep. It was a muck soil, from a foot to a foot and a half deep, underlaid with a heavy clay. Before draining it was the wettest field on the farm, and would grow only hay and oats, and never more than a half crop of them, and often not that, and was never sowed before June. Since draining it is the second driest field we have, and will grow a full crop of anything that can be grown on the high land of the farm. It has been sown in April every year but one since it was drained. The drains paid for themselves in two years. If I were draining the field again I would put a drain every two rods, for the crops are always better right over the drains than half-way between."

Now, I would say regarding that example, that these drains were 2½ feet deep, because we could not put them deeper; the outlet went over an outcrop of rock, and, carrying back our grade from that outcrop of rock, we could not go more than 2½ feet for a fall. We would put it deeper if we could; then it would not need this extra drain between.

J. A. FLETCHER, Fletcher, Kent: "This section of the country (Tilbury East Township) is on a fair road to improvement. Farmers are beginning to realize in hard cash that they cannot farm without drainage. I have enclosed a photo, taken on my farm (cutting wheat), which shows the advantage of thorough drainage. This farm of mine was practically a mud-pond seven years ago, when I bought it, and to-day I completed harvesting one 18-acre field of corn, which gave me the handsome return of over 3,000 bushels."

JAMES MARSHALL, Hamilton, Wentworth: "In fifteen years I have put in over twenty miles of drains on my farm, and my only regret is that I have not used more of my spare time and attention to complete the underdraining and bring the whole farm into a better state of cultivation. In 1897 I drained a 12-acre field, at a cost of $460, almost $40 an acre, drains being 25 to 30 feet apart and 3 feet deep. The next year this field yielded 80 bushels of oats per acre; while the adjoining field of similar soil, but not drained, yielded only 45 bushels per acre, thus gaining 35 bushels of oats per acre by drainage."

If there is a man that ought to be able to talk drainage, it is the man that has put in 20 miles on one farm. Now, when Mr. Marshall sent me in that report oats were selling for 44c.; I believe they are 41c. to-day. That gives $15.40 per acre, and half a ton of straw would give $4; $19.40 in the first crop from that drainage. That is after the price of drainage, even where it costs $40 an acre. He goes on: "Another year I got the following results: 45 bushels wheat on drained; 25 bushels wheat on undrained, thus gaining 20 bushels."

Wheat to-day is $1.10, and there is $22 right from wheat, and add on half a ton of straw, and you have $26. I will give you another example from nearer home.

R. H. McCURDY, Vienna, Elgin: "Last fall I drained two acres that formerly would grow nothing. They were low spots in a field. Cost $17.50 per acre. This year I had 30 bushels of fall wheat per acre on them, while the higher land gave only 15 bushels. The drains more than paid for themselves with this one crop. The whole 30 bushels was gain, as those spots would grow nothing before."

Here was land that had never grown him anything before. He spent $17.50 an acre draining it, and gets 30 bushels of wheat to the acre. The good land of the field gave him only 15 bushels the next year. I suppose we will find him draining the high land as well as the low land.

I am going to show you some samples of oats, corn and wheat. In June of 1908 I went to Mr. McCurdy's farm and surveyed 50 acres for him, and gave him his grades. He is a man who has the courage of his convictions, and he went to work and put in about 2½ miles of drain. At the end of each survey we held a public meeting and discussed drainage, and one of his neighbors applied to us to make a survey for him. Part of his farm was high and part low. Fifty acres of it was low, and he was never able to sow it until after seeding time. There is a stool of oats 2½ feet high, and here's a stool of oats from his high, loamy, good land taken the same time. He was able in 1909 to sow his flat land, that had always kept him back, three or four weeks earlier than he was able to sow his high land. These oats were both grown on sod. That which was drained was fall ploughed, and that which was undrained was ploughed in the spring, so that it was not a matter of difference in sowing or ploughing; it was simply a matter of difference in drainage. We could not handle the survey for his neighbour in 1908, but we turned it over to the district representative of that county, and he went back in June, 1909, to make a survey, and instead of having to make one survey for one of Mr. McCurdy's neighbors, he had to make nine surveys for his neighbors, who had been sitting on their fences waiting for their land to dry while Mr. McCurdy was sowing his low land.

PETER W. SCOTT, Belgrave, Huron: "The lowest field on my farm has drains 100 feet apart, and this spring it was the driest field and ready to cultivate the earliest. I consider in a year like this, thorough drainage doubles the value of the land for cultivation."

He sent samples of peas, one from undrained land and the other from drained. The biggest one was manured, and you see that the drained land gave about twice as high as the undrained. At the time this was taken, and the undrained was sown first, the crops of the drained land were twice as high the first week in July, and there were twice as many plants on the drained as on the undrained, and when it came to harvesting time he had 25 bushels of peas on the drained land and 15 bushels on the undrained.

The only difference between the manured and unmanured was that he got twice as much straw on the manured. These are facts from the field, and they are the very best testimonies we can have. The people who are talking drainage in the Province of Ontario to-day most enthusiastically are the people who have done most of it.

I know that this is pre-eminently a corn county. Mr. Duke and a few others of you will remember that a few months ago I wrote for information on the output of corn. On the difference between drained and undrained land I find it a little difficult to get the figures exactly. I have here a report from Mr. J. C. Thomas, of Blytheswood. He went to his field and took certain sections from his seed corn plot, and took the corn and weighed it, then weighed the stalks. Here is what Mr. Thomas reports:

MR. J. C. THOMAS, Blytheswood, Essex: "Part of my seed corn plot this year was on drained land and part on undrained. The results were as follows: Stalks, per acre, 4,000 lbs. on drained, and 2,320 lbs. on undrained. Shelled corn, per acre, 82 bushels on drained, 29.7 bushels on undrained. In my general corn crop I got the following results: Stalks, per acre, on drained, 2,970 lbs.; on undrained, 1,420 lbs. Shelled corn, per acre, 53.3 bushels on drained and 18.9 bushels on undrained."

There are 82 bushels of seed corn against 29¾, a gain of 52 bushels of corn per acre by drainage, and more than twice as many stalks on the drained than the undrained. You know what corn is selling for this year, about $18.70 for a ton, to say nothing of the stalks. Let me sum up these crop yields that I have given you. I have figured them up at market prices, and taking barley, oats, peas and fall wheat, and spring wheat, ordinary fall crops at market prices in September and October, the actual increase in output per acre was $19.60, for September and

October prices, and $19.62 at present prices, allowing an increase of half a ton of straw to the acre. This is the average of all the reports. Now, if we take with them hay and corn, we get a difference of $22.42 per acre, and these are pretty fair profits. You may say this is not all direct profit. There is more corn to handle and more wheat to bind, and more twine to buy. That is true enough, and it does take more to handle a large crop that a small one. On the other hand, it takes more labor to put your undrained land into condition, and I think the difference in the labour in the springtime will counterbalance the difference in harvesting the crop. So that I figure these profits represent an actual difference. What does it cost an acre to drain your land? That is a matter which varies according to the locality, and according to the price of tile and labor. Take the reports that have come in; the lowest is $18.00 and the highest $40.00, and strike an average of $25.00, and probably that is a pretty fair estimate. The lowest profit I find is $11.00 and the highest $36.00. So that you spend, say, $25.00 in draining your land, and you get back from it $11.00 to $36.00.

Have you got any other way in which you can invest your money and get it back in one or two years? I venture to say that you have not very many where you can put $25.00 on an acre of land and get it out again in one or two years. Some one will say, "I haven't got the $25.00; how can I invest it?" The Government has made provision for cases of that kind; and they say to you, "If you want to underdrain your land and you haven't got the money, we have got such faith in underdraining that we will advance you the price to drain the land. We will advance three-quarters of it and you can pay it back to us little by little in your taxes." The annual payment is $7.36 if you borrow one hundred dollars. You can go to your Township Council and borrow one hundred dollars. They get it from the Government at 4 per cent. interest; and you pay $7.36 a year for twenty years. One hundred dollars drains four acres; and the payment under that Act for draining an acre is $1.84. That is what it will cost you per acre per year to drain your land, and you get back from $11.00 to $36.00 as a result. Surely that is a pretty safe investment. You invest $1.84 a year and get $11.00 to $36.00 a year in return.

We have been making these surveys the Province over, and we are having twice as many applications as we can attend to. Last spring I saw that if we were to go ahead with the work, we must have more money. I wrote the tile manufacturers to find out how the tile output had increased since we started this work five years ago; and after I got in touch with the Clay Workers I wrote to the Bureau of Mines in Toronto, and found out that they had reports of the tile output, and got the figures since 1900. In 1900 the number of tile manufactured in Ontario was 19½ million; in 1901, 21½ million; in 1902, 17½ million; in 1903, 18 million; in 1904, 16 million (you see it is gradually going down); in 1905, 15 million; and I want to tell you that 1905 was the wettest year we have had in all these years, before or since. We began our campaign advocating drainage in 1905, and in 1906 the tile output rose to 17¾ million; in 1907 it dropped back to 17½ million; in 1908, 24¾ million, and in 1909, 29 million. It has almost doubled since we began our campaign in 1905. I want to go ahead with this work; we cannot stand still; we must have the courage of our convictions and go forward or else give up.

I took these figures to the President of the College and I said to him, "The people tell me that they have got twenty dollars an acre more from the land they drained; and the Bureau of Mines say that the tile output has doubled since we began work. Now then, if we figure out the amount that has been drained since 1905, it means fifty-three thousand acres; fifty-three thousand acres at twenty dollars an acre means one million and sixty thousand dollars; and that means that the farmers of Ontario have increased their annual output by one million dollars a year."

"Now," I said, "here is this list of applicants, and what are we going to do?" He said, "You have the argument, and it is up to us to give you the money," and I am glad to tell you that we are going to have four times as much this year for carrying on this drainage campaign. We have had three men making surveys in the past, and we expect to have nine men this year. We expect to be able to divide our men up, assigning a man to the counties of Essex, Kent, Elgin or Lambton, and another man to certain other counties, and the work will be directed from the College, so that we expect to have four times as much money for this work. We expect to carry on about four times as great an educational campaign, and I have faith enough to believe that we will double the tile output again in two years. I would say to you tile men that if we supply the demand for the tile it is up to the tile men to supply the tile. Quite a number of these men who sent in reports said: "We cannot supply half the orders this year." One man said: "I could have sold four times as many tile as I did." Others said they could have sold twice as many, and that is why I say that we have not tile enough. It may be that some yards have a surplus.

You can get on your land early in the spring and till it with less cost when you have it underdrained. Twenty-six of our correspondents reported a difference in the time of seeding; and, would you believe it, two-thirds of them were able to get on their land two weeks or more earlier than they were before. Fifty per cent. of them were able to get on their land four weeks or more earlier than before it was drained. Thirty-one per cent. of them were able to gain five weeks in time of seeding. Twenty-three per cent. gained six weeks or over, and fifteen per cent. of them gained the whole season, which means that they were able to sow on land that they never could sow on before. Perhaps it would be better to say they gained a whole lot of seasons.

Then again, it is not so hard on machinery. I remember running a binder over undrained land with the old water furrow in it, and every time it went in it would make me cringe. That doesn't occur on drained land. You do not need these water furrows, and your machinery will last longer on the drained land, because it is softer and more yielding. Just as a horse will last longer on clay roads that are yielding than he will on hard city streets, your machinery will last longer on drained land.

I want to say a few words about the soil conditions that bring about these great results. The first, and perhaps the most important, soil condition produced by drainage is that the soil is made more open, more porous. I wonder if you people have as much land as you think you have. Take a foot of your soil and take all the air out of it and I wonder how much actual soil there would be left. How much of your soil is air? You would probably be surprised to know that from one-third to one-half is air. That is on drained land. On undrained land it is probably not more than one-quarter air space. The undrained land gets saturated with water and it lies together, it puddles just like putty; but the drains never allow that access of water to accumulate, and therefore the soil never gets a chance to run together on the drained land, and consequently you always have a porous, open soil, which is very important, because the more room you have for the air in the soil the better; because the air is just as essential to the roots of the plants as it is to the tops or, indeed, as it is to human beings. The roots cannot live where there is no air, and that is the first great benefit in the improvement of the soil conditions, that there is more air space and consequently better ventilation.

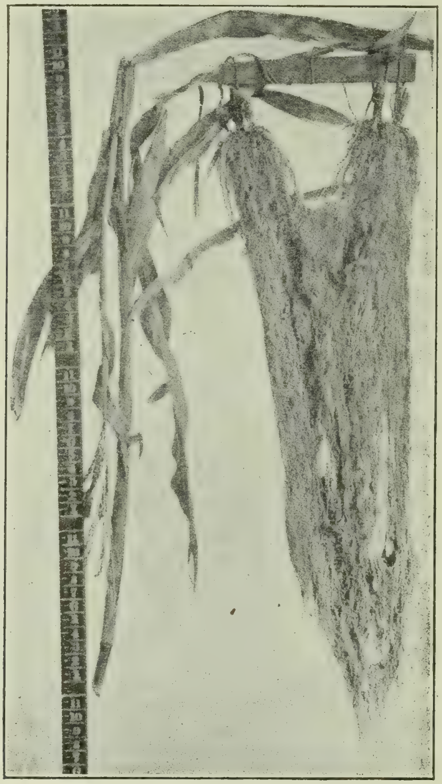
Now, the next point is that there is more water in the drained soil when it is ready to work than in the undrained when it is ready to work. That is strange. You are draining land to get rid of the water, and yet there is more water in it and it is not wet. You have all had this experience. You have taken a piece of putty that you thought was pretty dry and thought you would have to put more oil in it, but you began to work it, and by and by it worked up pretty fairly and you could work oil out of it. You have also taken mortar that looked pretty dry and after you worked it with a hoe you could see the water standing out on top. It is in that close, compact condition, the same as the mortar, but the drained soil has an open condition, and you can have just as much water in it and yet it will not be wet.

Q.—How would you account for the fact that a heavy dew will start drains running?

A.—That is something that has never been solved. I had my breakfast at the hotel this morning, and they brought me a piece of dry toast on a plate, and when I took the piece of toast off the plate it was covered with moisture. Where did that moisture come from? There was a piece of toast that was hot and dry; it had been dried out on the fire, and yet there was moisture on that plate. Now, then, the plate was cold. You have all seen this. Light a lamp and you will see moisture collect on the inside of the lamp chimney. Where did the moisture come from? In this case you have two conditions: You have the source of moisture, the flame supplying the moisture to the lamp chimney and the toast supplying the moisture to the plate. There was moisture in that toast that was hot. It was vapor, steam, if you like. There was the cold plate, and as the moisture came in contact with the cold plate, that cold plate turned it into water. It was steam before. And there was the plate drawing the moisture out of the hot toast. In the daytime your soil gets warm, and it is full of moisture in vapor, and it is also full of moisture as water. When the night comes on and the surface of the soil cools very rapidly, and the same process that went on in that plate goes on in the soil. Here is the top of the soil cold, and down below there is the warm soil supplying the vapor, and that comes up and condenses as water, right in that top soil, just the same as the water condensed on that plate from the toast, and that is the reason why the dew starts your drains running. It brings up water from below. It is not the dew that starts the tile running; there is not dew enough deposited to start them running; but it is this internal condensing of that moisture coming up from below to such an extent that the drains have actually started to run. The amount of moisture that is brought from below and condensed in the soil, we do not know; but the point is this, that it goes on, and that is one reason why the dew seems to make such a wonderful difference to our crops. It is not the dew at all; it is the cold surface layer, the bringing up of moisture from below and condensing it in the upper layers where it is within reach of the roots.

Drained soil has more water in it in July and August than an undrained soil. The drained soil has always the most moisture in summer. An old gentleman said to me at the Winter Fair that drained soil is never wet and never dry, and that is the important part of it, that it is never dry. The drain saves the moisture for your crops. It is not the excessive water in your soil that does the injury, so much as lack of air.

This drained soil brings up more water during the season by the process of capillarity. You have seen the lamp-wick dipped in the oil and gradually bringing it up to the flame. As long as there is nothing to use the oil, there is no oil coming up, but you start the flame to use up the oil, and it gradually brings up the oil and uses it. That force, that brings up the oil through the pores of the wick, is called the process of capillarity, and so the soil is just like the lamp-wick. Here is a drain right at the surface of the soil using up the water, and there is a great supply of water in the soil below, and the soil, like the lamp-wick, brings up the water to feed the flame of life in the plants, and all summer long your drained land keeps on bringing up that surplus of water by the process of capillarity. There is more root space in a drained soil. You who have our bulletin on drainage will find a couple of pictures, one with the roots going straight down and another with the roots spread out. Those of you who are familiar with pine know that the one grew on high land, where the drainage was good, and the other grew on flat land, and you know from that that the stand was thicker on the high land where the roots can go down, because they don't need to spread so much. Your crop roots need more room than you are accustomed to think. You will find some pictures which show the crop roots on clover and corn going down three and a half feet and four feet deep. You sow your grain in drills eight inches wide. The roots start to grow, they go down a little and come to some water six inches down, and they won't go down any farther. They start to go out sideways, and only go four inches till they meet some other roots coming the other way, so you can see that if the roots cannot go down there is not much room for them to go anywhere until they are met by roots from the next row, and just as surely as they cannot go



Showing the total roots of one hill of corn. Note one of the stalks, doubled beside the measuring stick.

down they are going to become crowded, and just so surely as the roots become crowded there will be small root development, and just so surely as there is small root development there will be a small plant above ground, there will be a small crop, a small yield, and a small amount of grain in the granary. The root controls the whole situation. Isn't it a fact that the first plants to suffer from drought are the ones on the undrained land, because the roots are small and they have got a long way to bring up any water, and therefore they suffer right away.

Right here is probably the best time to say something on the method of draining. If your oats have roots 2½ feet deep, and if your barley has roots 2½ feet deep, and those of corn are 3½ feet deep, is it not necessary that the drains should be a fairly good depth in order to get the best results from your farming? You must have such a soil condition that the crops will develop the richest root system they are capable of, and your drainage must be such as to allow the greatest root development the plants are capable of, and therefore, as a result of that argument, we believe the tile should be three feet deep. Mr. James Marshall, who put in twenty miles on his farm, says three feet deep, even in this heavy clay, is not too deep, and he says he would rather have them four or five feet if it were not for the expense of putting them down. Some of you have come from the Old Country, from Scotland and England, and I want to tell you that only last summer about twenty-five or thirty of the journalists of the Old Country were over in Canada, and I had the privilege of talking to them for a few minutes, and in the course of my remarks one of them, who was a farmer as well as a journalist, asked what my opinion was as to the depth of drains. I said "Three feet"; and he said, "Over in the Old Country, as the result of long years of experience, we have at last come to the same conclusion, and over there we are putting our drains three feet deep, and experience has taught us to do it."

The drained soil is warmer in spring than the undrained, about five or twelve degrees. Why is it warmer? For several reasons. In the first place, the drained soil is dry earlier than the undrained. A while ago I told you that a drained soil, when it was ready to work, had more water than an undrained soil when it was ready to work. But there is a long time when the undrained soil is not ready to work, and during that time the undrained has more water in it than the drained; and water is the hardest substance in creation to heat, and the more water you have in the soil the harder it is to heat. Therefore, your undrained soil, which is too wet and has too much water in it, will be slow in heating. You set a pail of water outside, and by and by you come along and find it is only half full. Where has it gone? It has dried up. It has gone off in vapor. Do you know what the boiling point of water is? Maybe you have been scalding pigs, and the water has got up to boiling point, and you cannot make it any hotter. You cannot make water hotter than the boiling point; you cannot heat water up more than 212 degrees at atmospheric pressure. You have all seen your wife set the kettle on the stove, and it has started to boil. If you put the thermometer in you would find it getting hotter and hotter, and by and by it starts to boil, and you cannot make it any hotter, although still there is heat going into that water; the fire is still sending heat into the kettle, but it is not getting any hotter. When it starts to boil it is turning the water into steam, and it takes five and a half times as much heat to turn it into steam without making it a bit hotter as it does to heat it from freezing point up to boiling point. What has that got to do with this pail of water sitting out there? Whether that water is turned into steam by boiling, or turned into steam just by drying up, it takes that same five and a half. Therefore, as long as the water is evaporating from the soil, heat is being used up in turning the water into vapor.

Now, then, here is the sun pouring down heat on your soil during the month of May, and your soil evaporating. What part of the sun's heat will evaporation use up? It is just like the fire sending heat into the kettle; how much of that heat is wasted? All the heat that went into the kettle after it started to boil was wasted. You do not get any result, and all the heat that comes down from the sun and turns the water into vapor, and does not heat the soil, is wasted. How much of the sun's heat is being wasted while evaporation is going on? Will anyone venture a guess on that? You will be surprised in the month of May, while evaporation is going on, to know that just about half of the sun's heat for the whole day is used for turning that water into vapor, and it is a very considerable loss of the sun's heat. But if you take your soil and drain it, it looks dry in a day or two after the rain, and you save a lot of the sun's heat just as soon as your drained soil stops evaporation. Therefore, the soil is warmer by five to twelve degrees; and that is important, because corn will not germinate until you get between 80 and 90 degrees of heat in the soil. Here is the undrained soil keeping it 10 to 12 degrees too cold. A poor start is fatal to the plant. It is often said that a good start is half the battle, and it was never truer than in the case of the seed which you sow and the plant which begins to grow from it. A good start is half the battle of life to that plant. If you stunt it in the earlier stages it is stunted through life, just the same as if you stunt a pig in his earlier stages, you can never feed that pig and get the profit out of it that you should.

There is another result from the increase in the temperature of the soil. I need not tell you farmers to-day that there are germs, bacteria, in the soil, little organisms that you cannot see with the naked eye; you have to have a microscope that multiplies thousands of times to see these little germs, but they are one of the important things in farm life. A plant cannot use sand, a plant cannot use clay, and a plant cannot use manure as such; that clay and that sand and that manure has to be turned into a soluble salt. It has to be turned into a condition that it will dissolve in water, so that it can go into the plant. These bacteria are the very things that take the soil and manure, combine them with the elements of the air and make them into a soluble salt, which then dissolves and goes into the plant to support it. These bacteria cannot live without air any more than you can. There are some bacteria that can live without air, but these that you want in your soil cannot live without it. They also require the proper temperature. As soon as they get uncomfortable they do not work well, any more than you do. If you were too cold, maybe you would work harder and get warmed up, but it does not seem to work that way with bacteria; they have not got sense enough to know that.

They find plenty of air, and they find plenty of warmth, and so they thrive to the best advantage. Unite the elements of the air with those of the soil and you provide abundance of food. The bacteria are to the plant what the cook is to the family; you may have plenty of food in your pantry, but if it is not in an eatable condition it is useless. And there may be plenty of plant food in the soil, but unless it is brought into an available condition it is useless. The bacteria bring it into available condition, and they work best in a drained soil. Therefore, it follows that the drained soil has more valuable plant food in it than the undrained; and, furthermore, the drained soil is three feet deep and an undrained soil only about one. The greater root system enables the plant to take advantage of this greater amount of plant food. Some of these bacteria are so constituted that if they cannot get the oxygen they want, from the air, they will turn round and destroy the plant food that is available.

If underdrainage will place the seeding time ahead and lessen the labor of tillage by half; if it will increase the output by twenty bushels of barley and twenty bushels of wheat; if it will double the yield; and if it will make fruit trees grow where otherwise they would not grow; if it will increase the profits from every acre by twenty dollars; if it will do these things, all of which our correspondents say it has done for them, then isn't it high time that underdrainage should become a general practice throughout all the wet parts of this Province. If you don't get the soil right you will not get good results. And in many parts of the Province—Essex and Kent and Lambton in particular—underdrainage is one of the essential features of bringing the soil into that satisfactory condition.

TILE DRAINING MACHINERY.

By W. D. McCaughey, Findlay, Ohio.

I am a farmer by profession, more than half of my life having been spent upon the farm. I have cut many rods of tile drain with a spade, and I think I know something of the subject upon which I am to talk.

I went into the tile draining machinery business because I believed that it supplied a long-felt want, and something that was just as necessary as other machinery that is used in agricultural work. The old-fashioned ways of doing things are past and gone. The typewriter has taken the place of the pen. The adding machine has taken its place behind the desk and the counter, and when you come to farm work the same thing has taken place. The reaper and the mower have taken the places of the sickle and the scythe, and the threshing machine has taken the place of the flail.

Almost every farmer knows that it is impossible to hire help to do farm work. The farmer realizes that he must in some way increase the productiveness of his farm, and the first thing he should do is drain his land. Many farmers say they will buy fertilizers, and they are all right. I do not want to say a word against fertilizers, but I will tell you that if you will drain your lands, and then use fertilizers, it will give you double the results.

Drained land will stand more drought than undrained land. These things being admitted, how shall we drain our land? Plans of drains have been presented to me by Prof. Day, in my capacity as head of the Buckeye Ditching Company, and I can say, with no hesitation, that none of the plans from other countries, such as Denmark, France and Italy, that I have seen surpassed those of your own Agricultural College at Guelph. One trouble I found with some plans was that they did not make their tile large enough. It does not cost a bit more to dig a ditch to put in a four-inch tile than it does to dig a ditch to put in half-inch tile. All the difference is in the price of the tile. The great trouble we have in this country is that the farmers are too economical, too close, and when they run their drains they take them through the low land, circling around along the water course and off the ridge. We say our lower land is the strongest. Why? Because the silt from the ridges and the upper ground gradually rolls down into that lower land, enriching it at the expense of the upper ground.

When you lay your drains do not put them around the low ground, but have a general outlet, and then lay your drains parallel to it, going right through the ridges.

I have drained many clay ridges, and these require tiling just as much as the black soil does, and you will get just as good results from draining clay soil as you will from draining black soil.

I put a ditch through my own land, and I went through ground that was so hard that it could only be dug with a pick. The first year I put it in corn, and it was about six feet high. I was surprised when I found such good corn. Then I put it in wheat, and the best wheat was right on the ridge where the tile drain went through. As the years went by, the drain gradually drew the water to it until that drain drained about two rods each side You cannot lay down any set rule for drainage. It must be in proportion to the porosity of the soil.

No man can cut an absolutely true to grade ditch with a spade. If the soil is exceedingly soft, when you put your foot on the spade you cannot cut exactly to grade. If you let a job of cutting tile drain, and decide to go through ground that is extremely hard, you will find that the tendency of the men cutting it for thirty cents a foot is to not dig deep enough when they come to these hard places. And if you are doing the work yourself, you are a little inclined to do the same thing. But when you do the work by machinery, the machine does not care whether it cuts three feet, or forty-two inches, or twenty inches; it simply rests with your brain as to what depth you are going to have the drain, and the machine will do the work and get it absolutely true. One advantage of a ditching machine is that it gives an absolute grade.

With one of these machines a grade as low as one inch in 500 feet can be cut exactly. You cannot do that by hand. You can lay every tile as you go along, and every tile will work ten years from the time it is put in, because it rests on a solid foundation.

The question may be asked, how do we hold that grade so true? We have a shoe at the rear of the machine, and the weight of the wheel rests upon this shoe. The shoe is made with a half-round piece of steel on the bottom, that makes a curve for the tile to lie in. The weight that is on it is about 3,000 lbs., and if there is any rise or fall this shoe is set so that the bottom of the drain is cut as level as this floor, and every tile lays right against another. The grade is one of the important things in connection with tile drains. Another point is that the machine does not go on strike, and I will guarantee that if you do your part the machine will do its part. We make the machines, and you must put the brains on the platform, and then you will have a perfect ditching apparatus. If you put a man to dig a ditch with a spade, he cannot do it nearly so well as we can with the machine.

Now comes in the question of the cost to the farmer. Do not calculate that you are going to get this work done for nothing, and do not think that the man who owns the machine is running it for his health. The laborer is always worthy of his hire if he does an honest job, and he should have a profit upon it. Do not consider that by using tile a little smaller that you are going to make money. It is a better investment to put in a good size, and it will pay you well to do it right. If you are plowing a field, do it right; if you are raising wheat, put your ground in order and do the work right; and when you buy your tile, if you are absolutely certain that 2½ inch tile will do the work, put in three inch. That is the way to do work on your farm. Run your tile parallel; do not try to follow the lines through the lowest part. Tile the land which is highest as well as that which is lowest. Open it up so that the soil can take in plenty of air to feed the roots of your crops, because by doing that you will get a better crop. The machine is calculated to do this work better than you can have it done by hand. Another great advantage of a ditching machine is that with it ditches can be dug from eight to ten months of the year. By hand you either have to ditch in the spring or in the fall.

The best time for ditching with a ditching machine is when the ground is dry. Have the lines for the tile laid out, with the fall that they are to have, consider the depth, and then the amount of fall you are able to give. The machine is calculated to work three feet deep in ordinary soil; that means clay soil. It will cut at the rate of about three feet a minute while in operation, and if you figure for a few minutes you will find that if you want to cut 100 rods a day, three feet deep, how many men you will need. The larger the machine the more men it will displace.

We are now using the gasoline machine, and have the web wheel in place of the regular wheel, so that you are travelling over safe ground. That wheel is made interchangeable with the common wheel.

Q.—How does the machine work in stony land?

A.—If it is extremely stony I would not advise buying a machine, neither would I advise you to buy one if you have a great deal of quicksand. If you have small stones the size of your fist, or a little larger, it will do good work, and if the stone is as large as your head and comes exactly in the centre of the ditch it will take it out; but an extremely large one it will not take out, and if it would, when it came round to the top it might drop on the belt and break it; therefore, I would advise taking the stones out by hand.

Q.—What is the price of the machine?

A.—Without steam, $1,200; 4 per cent. off for cash.

Q.—How will it work in stumps or roots?

A.—You cannot go through a stump, but it will cut a root off and go ahead.

Q.—Is the $1,200 machine the only one you have?

A.—No. I would advise buying a 15-inch machine, because it will lay all sizes of tile, from a foot down. We make three sizes for farm work, a machine which lays tile from three inches up, and another which lays tile from one inch up.

Q.—Does unevenness of the land make any difference?

A.—No, not unless it is beyond the depth of the machine. Suppose we come to a ridge and start at a depth of 2½ feet. The ridge is five feet in height. The machine is calculated to cut only 4½ feet, and it would leave six inches there that could not be cut. Now the machine will cut actually four feet nine inches, and if you take a plow and throw out a furrow, then it will be easy to cut the five feet.

Q.—Do you cut the same width for four-inch tile as for eight-inch or ten-inch tile?

A.—We make two sets of buckets for a fifteen-inch machine.

Q.—Will that machine make an open drain?

A.—No, the open drain machine is a different machine. I do not think in this section that you are justified in using it. It is made for the requirements of swamp lands, and we do a large business with this machine. If you had a great number of open drains to cut you might be justified in purchasing one, but I would not advise it. The time will come when you will be doing just exactly what they are doing in Iowa. You will be laying twenty-four-inch tiles in these open ditches, covering them up and farming all the land.

Q.—How much will the machine cut in a day?

A.—The capacity of the machine is calculated to be a hundred rods a day in ordinary ground, but if there are a great many stones or roots it will not do it. I have asked that question of several men who have run the machine for years, and they tell me that when they take the time off for running and moving they calculate the average for the season is from 80 to 90 rods a day.

Q.—Has the company any device for placing tile?

A.—We have not, but you can make a device of your own; you can adjust to that shoe another shoe curved the other way, and then you can lay the tile right in there.

Q.—I suppose it takes an expert to run the machine?

A.—The man who runs the machine does not need to be an expert machinist. He needs to be a man with brains, who will take care of the machine. We make the machine, but we want you to furnish the brains on the platform. We have what we call a cross-arm; that is, we have a pointed piece of wood that we drive into the ground, and then there is a piece that lays across that and then they are brought to a perfect grade, so that as we go along all we have to do is to keep the cross-arm in a direct line and machine is bound to go straight.

Q.—What is the average expense of running this machine in good clay, making a ditch three feet deep?

A.—A man that owned a machine said that it cost too much to keep it up, and I replied by saying that it was strange that he bought the second machine. I called to the bookkeeper, and asked him to bring that gentleman's account for repairs, and we found the amount of money he expended was about ten cents a day. If you are working in very hard ground that is full of hard stones, and the side-cutter strikes these stones, something has to go. We do not calculate that the sprocket-wheel will break. The weakest point is calculated to be the part that holds the side-cutter, and the next weakest point is the chain. The cost of the operation of the machine is about a ton of coal in three days for the small machine, and the larger machine used a half-ton a day, or from 800 to 1,000 lbs. a day—that is, about $2 a day. The oil will cost you in the neighbourhood of five cents to ten cents a day, and the repairs will probably come to about ten cents, making the total cost of running the machine $2.50 a day, including repairs.

Q.—What would it be for gasoline?

A.—Cut the above cost in the middle and divide it by two, and you will come close to it.

Q.—How many men are required to operate the machine?

A.—Two men to run the steam machine, and one man and part of a man to run the gasoline machine; but it does not take all his time, and he can spend his extra time laying tile in the ditch.

ADDRESS.

G. H. CLARK, SEED COMMISSIONER, OTTAWA.

My namesake on Parliament Hill, the member for Essex at Ottawa, has been saying a great many things to me lately about the great things I could see at this Corn Show. He painted it up in quite high colors, and that perhaps had something to do in directing my business near here, and it only took another day to come to this Corn Show. I will always have a little more respect for Mr. Clarke, but he did not paint the Corn Show as high as I would have, and as I will when I go back to Ottawa. It is really excellent.

Part of my interest in coming here was not so much as to what I would see in the interest of the farmers of South-Western Ontario as it was for the benefit of Eastern Ontario and the Province of Quebec and the Provinces by the Sea. We think we are even farther advanced in dairy farming than the farmers of Western Ontario. The dairy farmers of Eastern Ontario have become very largely dependent on ensilage corn.

Just take three of the largest dairy counties in Eastern Ontario, and they produce more than thirty-five thousand acres of corn. They do not raise corn for seed; they have to get their corn from the states to the south, and large quantities of it come from the State of Nebraska.

Mr. Grisdale and some others and myself at the Department of Agriculture at Ottawa have shown them, as far as we have been able, and I believe that we have succeeded in convincing them, that the corn they have been growing for ensilage was not sufficiently early to give the best results for ensilage, and we have been directing their attention towards getting their supply of seed corn from South-western Ontario.

I do not know what I will be able to say to them this year. To stand back and look at that corn, it is beautiful, it looks very fine, but I was permitted to go in and handle some of it, and I regret to say that there are some samples a little dangerous to use for seed, and if you want to get some of that trade of 35,000 acres in three counties alone (because it will be a profitable trade), if you want some of that, you must not endanger the ensilage crop of a single farmer in Eastern Ontario, not in one year. They must have the very best quality of seed corn five years out of five years.

A few obtained seed corn from Essex and have had a failure thus far. One failure, even in seven years, would mean that they would never come back, and we want them to get it from here for their own benefit, and we want them to have larger supplies from South-western Ontario for your own benefit. You must see to it individually and collectively that the seed corn that comes from here for these ensilage crops for the large farms in Eastern Ontario will be number one quality, and number one quality only.

It is up to the Ontario Corn Growers' Association to see what can be done to improve the crop. Professor Zavitz mentioned something about the Seed Control Act, and it is my duty to administer that Act in connection with the Federal Service. That Act does two things, and I want to mention one thing that the farmers have been humbugged with: In the first place, it fixes a standard below which it considers grass and clover seed to be screenings, a standard of five to a thousand; it considers anything below that screenings, or next to screenings; below that you must not sell for seed. Some men who call themselves seed merchants have labelled their seeds "Government Standard," knowing they would pass that standard. But the Act does another thing; it fixed the standard for number one quality, for timothy, alsike, red clover and alfalfa, and number one quality is a quality that no farmer here will complain about, and if you are willing to pay half a cent or one cent more for good clover seed and good alsike seed, see to it that your dealer supplies you with seed marked "number one," not as they represent, but seed that is marked number one. You have the privilege to send any of that seed, free of charge, to Ottawa, and if it does not come up to that standard we will see to it very promptly. We do not want the farmers to be humbugged with "Government Standard," below which everything else is screenings.

The amendment this year is doing something else. We know from investigation that there is a great deal of seed grain that is put on the market with very low vitality, especially garden seed and vegetable seed. We have said to seed merchants: "Good mangel seed should germinate 90 per cent., and if you put mangel seed on the market below 60 per cent. we will prosecute you." In other words, we fix the standard of vitality for good seeds of various kinds of the different crops.

From what I have seen of the farms of Essex County, if you went to Germany, Denmark or Sweden, and continued with the wasteful practices that are everywhere evident, even in the winter season, you will find it exceedingly difficult to earn a living for yourself and your family, and you would be crowded to the wall.

In Sweden the average size of the farm is twenty-five acres, many of them less, and the average size family on a twenty-five acre farm is seven. They have a little more than three hundred and fifty thousand of these twenty-five acre farms. Among these three hundred and fifty thousand farms they have at the present time forty-six agricultural schools.

If we had Schools of Agriculture distributed over the Province of Ontario that would give a service like these forty-six schools, we would have at least one in every county.

ADDRESS.

HON. J. S. DUFF, MINISTER OF AGRICULTURE, TORONTO.

I am pleased indeed to have the great privilege of addressing you for a few minutes to-night, but perhaps not so much for that privilege as to have been privileged this afternoon to see the splendid exhibition you have here under the auspices of the Ontario Corn Growers' Association.

Moving as I do and taking every opportunity which is afforded me of coming in contact with the people of this great Province, of this premier Province of our Dominion, I am wonderfully struck with the fact that beyond the knowledge of most of us, we have a variety of claims, and all that goes to make up a diversity of agriculture to an extent that is not known in any other province in the Dominion of Canada.

When I go into sections of the Province where I have never been before, what is uppermost in my mind is the fact that we, of this great Province know very little of the local conditions of the various parts of the Province. If I were to stand before such an audience as this in the Eastern part of the Province and tell them of the great Corn Show here in the County of Essex and the type of corn cultivated here, of its success and possibilities, they would scarcely believe me, because it does not dawn on the people who are living in the more northerly portions of this Province, that you are practically in a semi-tropical climate down here in Essex and Kent.

If there is one thing that I ought to do, if there is one thing that I ought to bring before the people of this Province, it is to endeavor to instil into the minds of those people, a greater appreciation of our Province as a whole, by becoming acquainted with the local conditions of the various parts of the Province. That can be done to a certain extent, not by personal visits, but by careful perusing of what comes to their hands in connection with agriculture. There is no doubt that the newspapers will tell the Province to-morrow of this Corn Show, and how many of our people who take the daily newspapers will give a thought to it? They never think of reading it. But if we could instil into the minds of the people, that if we are to do the best that is in us, we should find out the locality that is best suited for particular things, and then apply our energies in that direction, then we will be doing much greater work than we can without that knowledge.

It has occurred to me that the people of the County of Essex need not care very much whether they grow wheat or not. It matters very little to the people of this splendid county, or the adjoining county of Kent, whether they grow wheat, when they can grow tobacco and get good prices for it, and when they can grow corn and get good prices for it, and when they can grow fruit as you can in these counties; and if you will specialize in these you will be doing more as a community for the country than you can in any other way.

What I have said with reference to the people of the County of Essex is applicable in other lines of agriculture, to Grey, to Bruce, and to Simcoe, and many other counties that I might name in Western Ontario.

Mr. Clark, Seed Commissioner at Ottawa, called your attention to the enormous quantity of corn that is grown in Eastern Ontario for ensilage purposes, because it is a dairy section. We do not understand the great strides that have been made in dairying in Eastern Ontario. They have about twelve hundred cheese and butter factories in the East and only about three hundred in the West.

I was delighted at the manner in which Mr. Clark spoke to the people here in reference to seed corn. You must come up to the standard, and you must provide seed corn that will not be a failure in order that you may hold the market. One of the troubles we find to-day is the fact that the very moment that the farmer has his hand on a market at remunerative prices, that very moment the quality goes back. Those of you who read the papers will have noticed this very year, how many of the gentlemen engaged in the apple business in this Province have been before the "Beak" because of the violation of the Fruit Marks Act.

If every barrel of apples put up in the Province of Ontario for export to the British market were as represented, I venture to say it would mean many thousands of dollars to the people of this Province.

I think perhaps the greatest good that will come from this splendid Association that you have in this part of the Province will be the impetus that will be given to those that are engaged in growing seed corn, to grow the best possible quality, so that in the future, and I trust it will be only a little while, the people of this Province who require corn for seed for ensilage purposes, will be buying it here instead of on the other side—buying it in these splendid counties where you can easily grow far more corn than would be required for the ordinary seed corn business in the Province of Ontario.

Each part of the Province seems to be very happily situated with reference to its own special lines of work. We have our fruit belts and our dairy belts, and sections where there is nothing more remunerative than the growing of wheat.

Last fall I was at an agricultural show in the town of Goderich, where they had an apple display. I was talking about the apple districts of the country, and found that we have several belts in this Province that are suitable for growing apples. We have some tracts that are especially adapted for growing early fruit, and other tracts adapted for winter fruit. If you go into Northumberland and Durham, you will find one of the finest fruit belts, so far as apples are concerned, that can be found. Even along the shores of Georgian Bay, where I came from, are grown the best quality of peaches that have been grown in the Province of Ontario. They are grown right in the town of Collingwood, and also on the shores of Georgian Bay. At the same time that is not a district where peaches can be cultivated with the idea of making money out of them. Then, as you come down the shores of Lake Huron you are in the apple district; when you get to Lambton you are in a first-class peach district, and from there to Niagara Peninsula we have a great section of the Province that could be developed along fruit lines to the extent that no person can possibly dream of.

This last season over 500 cars of tender fruit were shipped from St. Catharines into the Canadian North-west. The other night at the wind-up of the Ontario Fruit Growers' Association, they had a little banquet. Before that time only a few cars of fruit were shipped to the North-west, but this year with the greatest fruit crop we have ever had in the Niagara Peninsula, with ordinary conditions, the market would have been kept flooded. Notwithstanding that great crop, it took them all their time to cope with the requirements of the people, and those who lived in the section of the Province where they did not grow peaches, notwithstanding the splendid crop, did not get many baskets of peaches for a small price; they were all sold at good prices. The railway people were at that meeting, to say to the farmers, "Improve your farms, underdrain your land, and increase your output! The more you do for yourselves the better it will be for us." They showed their sympathy with the farmer, not merely for the love of the farmer, but for the love of the business they will get from the farmer.

We have some other interests in the Province of Ontario in the northern regions. We have a great mining interest, which is to-day the talk of the world. In Cobalt we have not only the greatest silver mines in the world but also the most orderly mining camp in the world.

I would not like to retire from this platform without saying a word or two in reference to the work in which Mr. McKenney is engaged. I was delighted to hear the kindly words spoken by you about him, and I was very pleased to hear the response made by the audience. You will remember what was said by Mr. Clark with reference to the Agricultural Schools in Sweden. Some years ago there was a great deal of talk in this Province, there was some effort made to diffuse agricultural knowledge throughout the Province. True, we have a College at Guelph, an institution that is growing year by year, and which perhaps was never more popular than it is to-day. But after all there are only a few boys, comparatively speaking, who can avail themselves of the opportunity of attending that College. In any case the room is limited. What does it mean? It means a very large expenditure by the people of the Province for the up-keep of this College, and it only has a direct benefit to a comparative few, and the Government felt that by other means they might try the experiment of placing men from the Agricultural College in centres here and there throughout the Province, thus bringing home to the people as far as possible knowledge and enthusiasm in the line of agricultural work. Then representatives were appointed. Mr. McKenny was one of the first placed in charge of a section of the Province as District Representative. At that time there were also a few others appointed.

Last year we had eleven men doing similar work, and it is the earnest endeavor of the Government, as far as our revenue will allow, to move in the direction of sending graduates of that College here and there, attaching them to localities, to move in and out among the people and get them to become enthusiastic in the work in which they are engaged.

I was delighted when you delivered that address of "Welcome" to hear the tribute you paid to the agricultural people of this Province, and if there ever was a time when the farmers could hold up their heads and say, "We are the people," it is now. We are only coming to what is our own. We have always been the people of this Province. The only trouble was that we had not pluck enough to say so. We were acting on the assumption that because one boy goes out of the home and becomes a preacher, and another one a lawyer, we had an idea that these fellows were better than the chap who stayed at home on the farm, and it never dawned on him that he was as good as they were. If you want proof of what I say, look in the newspapers. For the last two weeks there is scarcely a paper that you can pick up but that has a big head-line on the high cost of living. And why is it that living is so high? It is as plain as the nose on a man's face. People are leaving the land and going to the towns and cities. The population of the towns and cities, not only in Canada and the United States, but all the world over, is increasing very much more rapidly than the producer on the soil, and consequently there are more people to feed and less people to produce the food which they require.

There are causes leading up to this. Many young men leave the farm because they do not receive that encouragement from their fathers and mothers that would have instilled into them a love of agriculture. I know the farm. I do not know the life of other people, but I have watched the careers of many of the boys whom I knew long ago, and many of them are lawyers and doctors and parsons; but take them all around, the average boys who stayed with the land are better off today than the fellows who left it.

Has it ever occurred to the average farmer that there is no class of people in Canada who have the wealth that the farmers have? What do the statistics tell us? They tell us that about 90 per cent. of the boys who go into business make failures, but it cannot be said that 90 per cent. of the farmers are failures. Go up and down the concession lines of any county in this Province, and you will see the people's homes and beautiful bank barns and nice orchards and the beautiful lawns; everything showing industry, thrift and intelligence.

If we lack anything as agriculturists it is perhaps because we are sometimes imbued with the idea that we have to work too hard. I do not think it is a very bad fault. In the neighborhood in which I live, I have seen in the long summer evenings, when an hour in the evening is worth a great deal to the farmer, and more especially to the young farmer, that after the six o'clock supper is over and the chores done and everything is nice and quiet the boys hitch up the rubber-tired buggy and away they hike to town. This is all right in its place, but I tell you frankly the business man who makes a success of his business does so by sticking closely to it. Take the store-keeper in this town or any other town, or lawyer or doctor or professional man, and you will find that the men who make a success in any line of life are men who make good use of every hour they have out of the twenty-four. Take the store-keeper in the country. He is there by eight in the morning, and standing there until ten at night, and Saturday night until twelve, watching for the customer, trying to be nice and affable. We should apply the same principle to our work, because in the winter time the farmer need not work very hard. The days are past when the lantern was swinging around the barn at ten or eleven at night. But in the long summer days, when the snow has gone, and as we say in our northern country, until the snow begins to fly in the fall, the farmer who is making a success of his business is busy. The farmer who has money in the bank and who can afford rubber-tired buggies is working every day and taking every opportunity, not losing a minute that he can possibly help.

In closing I want to point out this fact, and you can depend upon it, that as far as the Government of Sir James Whitney is concerned, there is nothing that they have given their energies to more than education and agriculture. We have eleven district representatives in this Province, doing similar work to Mr. McKenney, only on different lines according to the different localities in which they are placed. I think the people, irrespective of politics, all over this Province, are pleased, and as our revenues allow us, we are determined to follow that work up and help the people out in every way possible.

After all, the Ontario Legislature is only an administrative body, and if we with the funds available, do all we can for the people, then I am sure we will have due praise from those whom we serve.

I desire to thank the people here to-night for the very kindly response they have given. I will remember this Corn Show for two reasons, for I tell you frankly I have never been at an agricultural gathering, outside of the gathering I attended at Belleville in connection with the Eastern Dairymen's Association, where there appeared to be such a right down thirst for knowledge, and a determination on the part of the people to do better, and make better the conditions in which they find themselves. All that is necessary is to have been in town this afternoon, to say nothing of attending this meeting. I dropped in this afternoon to see what was going on, and when I saw this hall full of earnest people listening to the men addressing them, I made up my mind that the work of Mr. McKenney had borne fruit, and the people of Essex and Kent had determined, that from this time forward, " Onward " would be their motto. And I am sure that with the encouragement that has been given you, the time is not far distant when you will be able to supply all the good seed corn that the people of the Province of Ontario require for ensilage purposes.

ADDRESS.

Prof. L. S. Klinck, Macdonald College, Quebec.

I can assure you that it affords me a great deal of pleasure to have the opportunity, this evening, of addressing this representative body of citizens of the town of Essex, and the surrounding country. I am particularly pleased to have the pleasure of speaking under the auspices of this Association, which has from its work appealed so mightily to the people of this part of the Province of Ontario, during its present session.

The first session of the Corn Growers' Convention, held last year, awakened a wonderful interest in this, your greatest cereal, and that awakened interest is proving a wonderful factor in the improvement of that crop. If I were to mention some of the points which, perhaps, are worthy of attention, I would say that that Convention brought to the attention of those interested in corn production the importance of paying stricter attention to these great crops. In the second place, it has stimulated a rivalry among those growing corn, and as the Minister of Agriculture has told you, it has awakened an interest regarding the use of these crops and the best methods of tillage and cultivation.

It has not only encouraged the selection of the seed and the study of varieties and soil, but it has also brought to your attention the importance of good agricultural methods, and as a result of this manifested interest in corn we have a much greater interest manifested in drainage, a question of vital importance to corn growers. I think the most important point which this Convention has brought out, is, that it has brought to the attention of all, the unity of interest between the farmers of this part of the country and the business man.

I well recollect the first meeting of the Convention last year. It was made up very largely of business men, who came out to hear what would be said. There were few farmers in attendance. The next day the attendance of farmers was very much larger, and the third day they far outstripped those who represented the business and professional men.

This year, while the business concerns have stayed with the movement from the beginning, and have lent their active interest and support, the farmers have come in such large numbers that unless we get here in time it is necessary for us to remain outside, in spite of the fact that we have now two places instead of one as we had last year. This has brought the attention of the people to the important fact that our interests are all one. As farmers we are inclined at times to be a little suspicious, and have more or less a little standoffishness, waiting to see if the thing is going to go. If it is going to go we are quite ready to lend it our most active support, and if it is not, then we do not want to be mixed up in the thing. This is commendable as far as it goes, but we must direct the attention of the people to the great fact that agriculture is the greatest occupation of this country, and we are vitally interested in the progress which the farmers of this country make. And what is the object of this Convention?—because no movement of this kind can be sustained unless there is some defined object, some good reasons why the movement should be set on foot, and why it should be supported and sustained? Unless there is some good object, then we have no good excuse for the expenditure of the money, and Mr. McKenney's time and energies have been spent for nought unless we are about to accomplish something that is really worth while.

The motto of this Association is, "Better corn and more of it," and I believe the reason the management called this public meeting to-night was just to give the men in the town of Essex, who have not been attending the meetings, an opportunity of knowing just what is going on in their midst, and to see if they cannot catch a little of the enthusiasm which seems to have caught hold of some of the people of the town. People have got so enthusiastic that they do not care to wait for the car in the morning; some men, I know, drove in ten miles in order to be here at ten instead of eleven o'clock. Some people say, "What do you do at these Corn Conventions, surely you do not take up all your time talking corn?" and they say, "I suppose you spend considerable time telling the farmers just how to select seed and how to handle everything in connection with corn crops." And then they say, "The farmer is considered quite conservative; in fact he is considered to be a little slow." All of you who have attended this Convention know that there is nothing further from the minds of the people than that. It was said that the speakers had come with the intention of telling the farmers "How to do it." Had the speakers done that this hall would not be full to-night. Those who come to this Convention come with a message, and I dare say that the speakers, without exception, gather as much information at this Convention as any man who has attended one or two of the sessions.

What have we done? The first day was preparation day, and then we talked a little corn. The next day a little more corn, and then judged a little corn and saw a little more and investigated about corn. The third day we talked about corn seed, and then a little more about corn. Semi-consciously we began to talk corn, and at dinner time we talked corn and we ordered corn for dinner, and I heard that some had corn both in meat and beverage. (Laughter.) During all this time the enthusiasm was growing, and this thirst for knowledge was evident in every way. I think that the next year will be very much the same as last year, when some of the fellows came to me on the third day and said "Do you know last night when I fell asleep I began to dream about corn. I thought it was summer, and I found myself out in the field looking for that good ear off the good stalk, and I got my seed corn selected in that way, and I strung it up and got it dry in a place where there was a good circulation of air and no danger of frost, and later I got a good test just as that fellow said it was best to do. I even went so far as to grade it properly and put it in a bag containing about a bushel, and strung it up ready for the spring." Another said he had spent a night judging corn—yes, many of them last year spent restless nights, and probably many will do the same to-night and to-morrow. That is what we are doing, awakening a little enthusiasm, a little interest in our business. To my mind the people who become the most enthusiastic, are not some of the young fellows. I like to talk to boys, and I know that it is very difficult to get hold of men who have grown gray in the business and get them enthused. I remember a few years ago meeting an old gentleman who came up to the short course. He was invited to a seat at the table to judge corn. "No," he said, "I am too old. I have grown corn for fifty years, and I guess I know a thing or two about it." Well, he was not urged just then, but a little later he was asked again, and he said, "I cannot see," and in addition to that he said he could not stand up for two hours. We got him a keg and put a plank on it and he sat down and began judging corn, and he was just as completely tangled up as most of you were about this corn. Fortunately the time was longer, and he became more and more enthusiastic, and he soon became so enthused that he wished to be allowed to spend all his time at corn, and as he was an old man that privilege was granted him by Prof. Holden. Toward the end of the course the old gentleman got up and said: "Boys, I have grown corn for fifty years, and had I the opportunity of learning fifty years ago the many points on corn that I know now, I would have revolutionized my county forty years ago. But," he said, "I did not know of these things, and I had got to that point where I thought there was nothing more to be known, simply because I had lived so many years and grown corn such a length of time. But now I want to notify you young fellows that it is up to you to brace up; because I am going in for the Whiting Trophy, and you will have to sit up nights if you beat me, and I will give a one hundred dollar gift to the boy under eighteen who brings out the best sample of ten ears to this show next year." He went home. He had one hundred and fifty acres of corn, and he said to his men, "Every ear that you think will be a winning one, bring to me at night, and I will take it and give you credit for it, and I will give you five dollars for each ear that is a winner. He worked over his corn in that way, and to make a long story short he won the trophy next year.

There was a man who had decided that he had lived too long on the farm and he was going to retire, but he is still a farmer. This was eight years ago, and he is getting a strain of corn that is winning money in the North-West to-day. And he has got something to live for and work for that is worth while. And if we can get hold of the old fellows like that, what is it going to mean for the young fellows? What is the cause of this enthusiasm? Simply that we have come to know the men who know corn and will get enthusiastic about it and sit up all night and talk about it.

Other subjects come in that bear directly upon corn production, such as cultivation, rotation and fertility of soil, but, after all, while corn is an important subject back of it lies the soil.

I think Pope said that the greatest study of mankind was man. Then it seems to me the next greatest study is the soil, because man is wholly dependent upon the soil, and if it is true that agriculture is the fundamental support of this country, it is quite true that soil fertility is the absolute support of Canadian agriculture. Therefore, we must pay strict attention to our soil. I think J. J. Hill was not very far wrong when he said, "The high cost of living is the cost of high living." The other side is that of supplying the demand, and certainly the farmers are having their innings to-day. The supply does not come up to the demand. I do not see why anybody should complain. Goodness knows we have had hard times long enough, and I think we all rejoice to see that condition brought about. Larger crops and better corn and more of it, and if we make money we are going to spend it. I do not think any of us will swell our bank accounts. I am inclined to think that the majority of men interested in this work are interested in bigger crops, because of what it will bring to those who produce the crops, and after all, these are the things that are really worth while, if we have larger crops we will have better farms and better homes and better schools and better churches, and these are things that are really worth while.

I am not one of the men who think that a man who is interested in bigger crops is just interested in bigger crops because they are going to enable him to buy more land to grow more corn to feed more hogs to buy more land. That is not the rule. By having larger crops we will be able to give the boys and girls better chances. I am not at all in sympathy with the sentiment that I do not want my boy and girl to work as hard as I did. God knows, work never hurt anyone. But I believe the reason we are interested in this, is because it will enable us to give our boys and girls, not an easier time, but a better chance, and that is what this Association stands for in its broadest and best sense. Just so far, I am sure that we all wish it very great success.

ADDRESS.

PHIL BOWYER, M.L.A., RIDGETOWN.

I feel quite honored by the compliment you have paid me in asking me to address you this evening. I take it merely as a compliment, because at this late hour you are not looking for an address, and I did not come with a prepared one. I have not had the advantage of the other gentlemen who have spoken here to-night, or even of my fellow members of the Legislature, the Hon. Mr. Duff and Dr. Anderson, whom I believe do some farming. I have never had the privilege of farming, even in my younger days, and the only corn growing I have ever done has been on a very limited area—not over two feet. I might say, however, that I have taken a deep interest in this movement. I have been in close touch with the Corn Growers' Association on two occasions. One was a year ago, when I accompanied your most able Representative to our friend the Minister, who has spoken here to-night, to urge upon him to give a grant to the Corn Growers' Association. We succeeded in that, and then the day before I was leaving for Toronto I was called up by Mr. McKenney twice on the telephone, and I had pressed upon me with all the vigor that gentleman is capable of, two things; the first was, "You are to get an increased grant for us," and second, "You are to see that the Minister of Agriculture comes to Essex." We have not yet secured that grant, but we were successful in the other part, and you have had the pleasure of listening to the Minister of Agriculture here this evening, and have learned that he takes great interest in the counties of Essex and Kent.

I know you have all been delighted, and I am sure that I have been delighted, not only with his address, but with the addresses of all the other gentlemen who have spoken. While I am not a farmer, I have every reason to believe that I shall be dreaming about corn for many a night. I have thoroughly enjoyed myself at this Convention. I liked the speeches, I enjoyed the singing of the young ladies, and every part of the Corn Show, and I feel proud that the greatest ear of corn I saw there, and the largest ones came from East Kent.

Another thing which has pleased me is that our eloquent chairman comes from the county of Kent. Kent does not grow as much corn as Essex. You grow six million bushels, while we grow only five millions, but we are growing corn and a few hundred thousand bushels of beans, and I think some bean growers from Kent were here last night discussing the matter of amalgamating with, or becoming associated with the Corn Growers. They broached the subject to me, and talked of forming a Bean Association. I said it would never do to have too many of these Farmers' Associations, but what you had better do is to amalgamate with the Corn Growers, and style it a Corn and Bean Growers' Association. You might also take in tobacco, and then it would be a Corn, Bean, and Tobacco Growers' Association. Your exhibition would be larger because you would have Corn, Beans and Tobacco. Your show could be held one year in Kent and the next year in Essex. There would be more variety, you would attract more people, it would be less expensive to carry on, and the Government would only have one grant to make. I think the Government would rather give an increased grant to a united association, than a small separate grant to two or three associations. I do not know whether the Minister of Agriculture merely hinted at a larger grant or whether he was plain about it.

I had six letters sent to me lately asking me to support a grant to the Fairs' Association of $30,000 more than they are getting. I answered that I certainly would be pleased to support any reasonable grant that the Government could give the Agricultural Institutions of this Province. But I said, "Let me remind you that while it may be difficult for the directors of the Agricultural Societies and other Associations to carry on their work, the Government, itself, has financial difficulties." I have heard the present Treasurer of Ontario say, "So long as the money comes in, we are ready to spend it in the interests of the people; but it is my duty to see that we do not spend more than we take in." We must not encourage deficits. We have not had any deficits so far, and as the revenue has increased we have given larger grants to agriculture and education. There is no mysterious, providential, Heaven-made channel through which money is running into the Provincial Treasury at Toronto. The Government must be able to see where the money is coming from. It will never do to dole out money indiscriminately to each and every person who asks it. But that is not to say that the Government should not increase the grant to over $70,000. I merely wished to remind these gentlemen that it was easy for them to ask for $30,000 and easy for the secretary to send me a copy of the resolution.

I also wish to say to the gentlemen clamoring for more money, that if the Government does accede to your request, do not let me see you at a political meeting at the next general election applauding any speaker who points out in a loud strong voice "The great increase of the expenditure in the Province of Ontario under this Government." Remember that you asked for it. That is very plain talk, but that is the way I always talk, and it has never hurt me yet.

While members like to get all that they can for their constituents, you must remember that we are only trustees, and we must be wise trustees, and the Government has not money without limit to give. The Government has been very liberal, and our good friend the Minister of Agriculture is always sympathetic when we talk about grants to Fairs or Farmers' Institutes. The present Minister has proven a worthy successor to the Hon. John Dryden and the Hon. Nelson Monteith, and the only reason he will not give all we ask for is simply that everything must go before the Provincial Treasurer, and he is a "watch dog of the treasury," if ever there was one. If the money were his own he could not husband it with greater care, and he is fully determined that, so long as he is the Treasurer of the Province, while he is willing to give to the people all the revenue he can, he will not promise an expenditure that will exceed the revenues.

I am satisfied that you will get all the grants and all the aid and assistance that this Government can possibly give you, and that is all I have to say.

SOME POINTS TO CONSIDER WHEN PREPARING A SAMPLE OF CORN FOR EXHIBITION.

1. Select your corn in ample time to have it thoroughly dried before the show.

2. In making the final selection, lay the ears out on a table where the light is good, placing the butts of the ears even with the edge of the table. This will facilitate the making of a close comparative study of all ears likely to be eligible for your sample.

3. Next get out your best ear. With this before you as your standard, pick out the required number which conform most closely to it in all the essentials that go to make a good ear.

4. When you have satisfied yourself that you have the best ears out, so far as this can be determined from an outward examination, remove a representative kernel from the middle of each ear and place it on the table, germ side up, in front of the ear from which it was taken.

5. Then make a comparative study of the kernels. All ears showing poorly shaped kernels, and those giving evidence of impaired vitality should be discarded, and ears of better quality substituted. No judge will take objection to a missing kernel or two if they have been taken from the place indicated, as this is the only way an exhibitor can determine the shape and quality of his kernels. Removing kernels for this purpose is very different from removing mixed grains and substituting others therefor. In a close contest the latter would be regarded as a disqualification.

6. After the best ears, as shown by conformation and quality of ear and kernel, have been chosen, it is allowable to groom the sample. The cob at the butt may be trimmed, silks may be removed and the ears straightened if necessary. Exposed tips, however, should not be removed.

7. Having gotten the sample into show shape do not leave it, even over night, in a place where mice can possibly get at it. The inherent fondness of these animals for this grain has ruined the sample of many a hopeful prospective exhibitor.

8. In packing the sample for shipment do not place the ears loosely in a bag or basket. Wrap each ear separately in newspaper being especially careful to protect butts and tips; then pack snugly in a box so that the ears cannot shift.

9. See that your name, together with the proper entry, is on the inside as well as on the outside of the box.

10. No matter whether you come within the money or not, take your corn home. If you have done justice to yourself in making your selection, you will have in your sample, so far as one can judge by a physical examination, the very best seed ears in your entire crop. They should be worth more to you than to anyone else. You cannot afford to lose them Take them back. They will form an excellent nucleus for next spring's seed block.

ANNUAL REPORT

OF THE

Bee-Keepers' Association

OF THE

Province of Ontario

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of Your Honour, the Report of the Ontario Bee-keepers' Association for 1909.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

Ontario Bee-Keepers' Association.

Officers for 1910.

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First Vice-President: W. J. Craig, Brantford.
Second Vice-President: W. A. Chrysler, Chatham.
Secretary-Treasurer: P. W. Hodgetts, Toronto.

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Ontario Agricultural College: Morley Pettit, O.A.C., Guelph.

Committees:

Horticultural Show: President and Secretary, with E. Grainger and H. G. Sibbald.
Honey Crop: President and Secretary, with W. J. Craig and H. G. Sibbald.
Transportation: President and Secretary, with J. D. Evans.
Revising: H. G. Sibbald, Morley Pettit.

Representatives to Fair Boards:

Toronto Industrial: J. D. Evans, Islington.
Ottawa Central: W. J. Brown, Chard.
London Western: F. J. Miller, Ealing P.O., London.

Treasurer's Report.

Receipts.

Cash on hand Jan. 1st. 1909	$9 24
Membership fees	198 90
Legislative grant	425 00
Affiliated societies dues	55 00
Balance due Treasurer	64 26
	$752 40

Expenditures.

Grants to other societies, fairs, etc.	$249 98
Expenses for convention or regular meetings	43 50
Officers' salaries	25 00
Directors' fees and expenses	50 80
Postage and stationery	14 57
Printing	42 25
Advertising	24 00
Periodicals for members	184 36
Cost of reporting	75 00
Labor at Honey Show	9 00
Affiliation fee, Horticultural Exhibition Association	5 00
Railway expenses of committees.	28 96
	$752 40

Martin Emigh,
Treasurer.

Audited and found correct, Nov. 10th, 1909.

W. G. Lindsay,
Auditor.

ONTARIO BEE-KEEPERS' ASSOCIATION.

The Annual Meeting of the Ontario Bee-keepers' Association was held in the County Council Chamber in the City of Toronto, on Wednesday, Thursday and Friday, November 10th, 11th and 12th, 1909.

PRESIDENT'S ADDRESS.

By William Couse, Streetsville.

As bee-keepers, as an Association, as citizens of the Province of Ontario, we have a great deal to be thankful for. We have been able to secure an excellent crop of honey of the best quality and realize on it a good price and with quick sales. From information gathered the greater part of the honey has gone out of the bee-keepers' hands and much of it out of the Province to the west, where there is such a growing demand. As bee-keepers we can well afford to increase our stock of bees to fill the want that seems beyond our present powers to fill, as from information gathered many bee-keepers sold short and have been trying to purchase from their neighbours, who are also short. This has not always been the case at this early date. The quality of our honey has had much to do with bringing this about. We must not be satisfied with the present standard, but keep on raising it to greater perfection. We believe it has no superior at present. To use the words of a very large buyer who is particularly fond of honey, and has opportunity of testing the honeys of many different countries, none is its equal. As the production of honey is beneficial to other industries, such as fruit growing, horticulture and clover seed growing, bee-keeping may well be considered an asset and benefit to the Province of no small amount.

As an Association we have every reason to congratulate ourselves on reaching the high level which we have attained. We have an Association of considerable importance, its members being drawn from all parts of the Province, thereby raising the standard and increasing the knowledge of bee-keeping the Province over.

We have a foul brood law which is recognized and copied by other countries, which has been the means of keeping down, and we hope will finally eradicate this dreaded disease. To accomplish this we have now fourteen inspectors of apiaries appointed from among the very best bee-keepers of the Province, who are imparting a general knowledge of bee-keeping on every line, as well as on the foul brood.

We have now at Jordan Harbour a Government apiarist, whose duty it is to make experiments in all matters for our benefit, and also to lecture and demonstrate to pupils on apiculture at the Ontario Agricultural College at Guelph. We believe that this appointment will help us greatly in reaching definite conclusions by experiments in many points. One of the things he might do would be to import queens direct from other countries, and give us the benefit of their breeding by distributing them over the Province when the stock proves good.

We have a crop report committee which we believe has been of great value to the members of the Association, and to what extent some have very little knowledge, particularly those who are not members of the Association. We feel that there are many bee-keepers who should be members of the Association, and they are cordially invited to become such.

For six years we have joined with the Fruit, Flower, and Vegetable Growers' Association in making a combined exhibit of our different products. This may not seem of very great importance at first sight, but we believe that Toronto is the greatest honey consuming city in America, as at present almost all wholesale and retail grocers of any importance handle it, whereas twenty-five years ago the druggists handled the greater part of it. We believe this has become so from the fact that the honey has been exhibited here as nowhere else for all these years.

All this has been accomplished, not only by the officers and members of the past one, two, three or more years, but by the assistance of the original promoters of the Association, and we are now reaping what they sowed; therefore, let us do something for those who follow us.

As citizens we feel that we are being treated fairly and liberally by the Provincial Government in the matter of financial assistance—greater than ever before; and if we do our duty and prove our worthiness, we can hope that our worthy secretary, who is so closely connected with the Department of Agriculture, will care for our interests in the future as he has done in the past and greater developments may be looked for each year.

In holding the position of President for the past year I have felt it a great honour conferred on me by the members of the Association, and I can assure you that in every particular all our Association work has been of the most pleasant nature.

There is one officer that I regret decided a year or more ago that it was his duty to resign, that is our old associate and friend, Martin Emigh, the treasurer, who has kept us afloat and in a direct line for so many years. I am sure you all regret this separation, and had you been as closely associated with him as I have been for a quarter of a century, you would know more of his worth personally, and as an Association worker. There is no record against him for kicking over the traces in all these years.

In conclusion you are all cordially invited to take part in the discussions at each and every session of this convention, so that we may be greatly benefitted by being present, and this invitation is not only to our own bee-keeping friends, but to those from across the border, whom we are so pleased to have with us. We will be benefitted by their presence in friendship as well as business.

Mr. H. G. Sibbald, in replying to the President's address, said: On the honey situation the President takes occasion to congratulate us on the good prices obtained and the good market, and that honey is practically scarce so early in the season. That is a fact we are all very glad to know. I believe that the dark days in honey selling have passed over and honey is becoming more and more a table article. People seem to forget about putting up preserves and take honey; it is easier, and I am glad that it is easier.

The President mentioned the foul brood situation. It seems a curious thing to me that after all the help we have had on this foul brood question, and the more we find out, it is almost an impossible thing to get rid of. I do not know whether I feel just as jubilant about getting rid of it to-day as I did three years ago. It seems almost impossible to get rid of that dread disease.

We can congratulate ourselves that we have had a great deal more help, and that we perhaps will get more help in the future. I hope we will.

Then our experimental apiary has been inaugurated this year, and Mr. Pettit is on hand to help us out with anything that troubles us. I hope that emphasis will be laid on training young bee-keepers so that we will be able to get help when we want it.

Then as to the bringing in of queens, there is a good field there for an experimental apiarist. People come to convention here, and they are bewildered by the difference of opinion of different bee-keepers, and some of them go back home and do not know hardly what to think. If Mr. Pettit will take all these differences down and solve them, and prove who is wrong and who is right, that will be a great help to us.

The Crop Committee Report has been mentioned as being of great value. That will likely receive attention later.

The Horticultural Show is another gift from the Department of Agriculture. It should be a great help to bee-keepers. I think exhibitions of honey always advertise and do good, and I think those men who are exhibiting honey do more or less good to the whole fraternity.

Mr. F. J. Miller, in replying to the President's address, said: In the selling of honey I think there is a bright outlook, as has been mentioned, and the markets are firm, and I think we can trace this back to our Crop Committee as having done good work for us, and the Department of Agriculture has helped on in that respect more than many of us know. The membership, I think, we should have doubled—we are lacking in that—in order to help on the work. There seems to be great apathy and indifference. Each member should work to bring in others, and our membership should be doubled. It might be, quite readily and easily, and by that means the Department of Agriculture would be shown the need of giving us greater aid, and it would be forthcoming, and in that way we would all profit.

WAX CRAFT.

By J. L. Byer, Mount Joy.

Beeswax, we know, is a mysterious substance secreted by the bees and not gathered, as our forefathers used to think. We cannot understand the process any more than we can understand how the spider spins his web. Wax is a product from the body of the bee. We find if we look through ancient history and along through the mediæval ages wax was known in a commercial way. Beeswax, I believe, was of much larger production many years ago than now, but modern methods of bee-keeping explain that. Mention of the use of wax in the fine arts was made away back as far as the second or third century. We find also that the ancients had a knowledge of the art of making wax flowers from beeswax; it was rolled out in thin sheets.

Beeswax to-day comes into competition with many other waxes. I think paraffin and ceresin are most largely used for the adulteration of beeswax. While wax is simply a by-product, and does not secure nearly the same attention in production as honey does, yet the great packing houses of Chicago and other places pay their dividends to the stockholders from the by-products, things formerly wasted. I have been impressed with the fact, in the last two or three years especially, as to the enormous waste of beeswax in the country. I would not be capable of making even an estimate of the thousands of dollars of wax wasted in Ontario every year, without going outside of the Province, and this condition, to say the least, is poor economy. And it is well to remember that while beeswax comes into competition with a number of inferior waxes—I use the term guardedly—it seems to me that the use of beeswax is increasing all the time, and there are calls for beeswax in the last few years in certain lines that in other years I had not the faintest idea it was used for. For the last three years I myself have supplied beeswax to a firm that makes a special line of paper. I know another bee-keeper that is supplying exclusively a firm of engravers with wax for silver plating and work like that, and they are particular as to the kind of wax they get, as to its purity, as to how it is rendered and so on.

The extracted honey producer is more largely interested in the line of wax production than the comb honey producer, because the comb honey producer does not have cappings. The chief sources of wax are cappings and old combs that are filled with drone cells and misshapen and not fit to be left. If you happen to use extracting combs with narrow top bars, you will get a nice little income by scraping those every year. I have seen these same kind of combs used year after year by lots of bee-keepers where they never were cleaned up at all. There are big wages in scraping off those combs, to say nothing of the nicety in handling them for next year's work.

Another source of wax production, which is not so welcome to the most of us, is when we happen to get a dose of foul brood. One man melted up over 5,000 combs, and if it had not been for the wax press it would have been a hard matter to estimate the big loss he would have had, but the wax he received more than paid for all the foundation he needed, and he had about $50 to $75 to the good.

We cannot speak of wax production without coming to the question of how best to secure the most wax, and then we get into the question of wax presses. To get good results in rendering up combs, we must have some kind of wax press. I have had slumgum sent to me different times from different bee-keepers, and while I have not taken the trouble to bring any figures here, I want to say every time when the wax press was used I could make big wages in handling that slumgum which was sent to me, but it is not a nice job. It would run from 25 to 30 per cent. of wax on an average. As to presses, I am not a bit backward in saying I would not have one of the German wax presses if you would give it to me as a gift. Mr. Greiner, of New York, reported that with hard work and good faithful attention you could get about fifteen pounds a day; and if any bee-keeper goes and spends all day for that amount I do not wonder that he would be disgusted with it. With regard to the press Mr. Herschiser has brought out I am not competent to make any remarks, because I have not used it, but my impression is for the ordinary bee-keeper it is a little too bulky and cumbersome. I think Mr. Herschiser will agree with me that we should have some special facilities and special rooms, and if that is so there is no question you will get all the wax, or nearly all of it. The next press after the steam press I used, was the Hatch-Gemmell press, and I might say that that press is still my preference, all things considered. Two years ago, you will remember Mr. Sibbald bringing out an improvement, in his estimation, on the old Hatch-Gemmell press. He went to a lot of trouble and had it here. He got out a model, and it was illustrated in our Annual Report. I have tried the Sibbald wax press, and for some reason I cannot make any headway with it as compared with the old Hatch-Gemmell. The only fault I had with the latter press was in applying the pressure. The pressure was applied in the centre with a screw, without having a cap on it similar to a jack-screw, to hold it steady, and I found the screw was turning around all the time, and I was bothered sometimes with the follower tipping. I got that rectified, and now it is all right. We found by actual experience in three or four days' test that we could get a very small percentage more of wax with the Sibbald press than with the Hatch-Gemmell, but, on the other hand, the extra work more than counterbalanced that. I only made one test as to what wax we were leaving in the slumgum. Last winter some time we rendered up one afternoon with the Hatch-Gemmell press 127 pounds of wax. More than one-half of it was from old comb, and the balance from scraping the narrow top bars. We saved that slumgum, and while it was still moist the next morning I happened to have a wax press there of the model of Mr. Sibbald's, and I suggested we take this slumgum and see how much wax we could get from it. We worked all day and we got 6¼ pounds of very inferior wax. The question resolves itself with me to this, if we had run that same slumgum through the Hatch-Gemmell we would certainly have got some wax anyway.

As to the purity of wax, Prof. Shutt and others have given us different tests from time to time. Paraffin and ceresin, I believe, are the main adulterants. If the beeswax is pure, and if you take and chew a sample you will find it will all granulate in your mouth. If there is any great amount of paraffin along with it, it will be pasty and act like gum in your mouth. It is a simple test, which I am assured by manufacturers and others will tell if there is any perceptible amount of paraffin with it. Ceresin, I understand, is the main adulterant used in comb foundation. They tell me as good a test as you can make for that—I have never tried it myself—is to take a hot iron and drop a sample of what you know to be pure beeswax on it and notice the smell and colour of the smoke, and then take your suspected sample, and if there is a very small percentage of ceresin in it you can tell it right away, a very fatty pungent smoke will come from it.

In our experience the quality of wax from the hot water press is not as good as from the Hatch-Gemmell. We rendered this 127 pounds and sent a shipment to Mr. Craig, just as it came from the press, and he reported it O.K. I used sap pans and covered them up well and let it cool slowly. Sometimes you will notice cakes of wax will start to check all over the top. That is the fault of cooling too fast. On the other hand we sent some 40 or 50 pounds, which was put through the hot water press twice, and it was spongy at the bottom.

We should be very careful in rendering our beeswax. The only specification the firm that I have supplied for the last three years sent to me was, we want you to guarantee absolutely there has not one drop of sulphuric acid ever come in contact with that wax. They don't object so much to the colour. They use that wax in making a certain grade of paper. I believe the sulphuric acid is sometimes left in the wax and it affects the steel rolls. The same proviso is made with reference to the wax supplied to the Electro Plating Establishment. I believe it is possible to spoil the texture of wax for the fine arts and some lines of work by over heating. You can prove it by a single experiment. Take one lot of wax as soon as the comb is thoroughly melted, and press that out and allow the balance to boil for half an hour or so, and you will find the wax damaged. The Root Company have told me they have come to find that the less sulphuric acid that is used the better. If they are supplying wax for any of the fine arts or any fine manufacture, they too are careful that it has never been subjected to sulphuric acid.

W. A. CHRYSLER: The principal thing that I wish to speak about is the refining and rendering of wax. With wax properly rendered it would be unnecessary to be refined with sulphuric acid. I find that any trace of sulphuric acid injures wax. I contend that wax that has been spoiled probably from improper rendering can be refined so that it will be nearly as good as any wax, and will no doubt be accepted by all the trades as no different from the wax that has not been refined with sulphuric acid.

No sulphuric acid should be put into beeswax in its pure state as we buy it; it will burn it; it will carbonate it. When I have to refine beeswax I take a certain amount of sulphuric acid and dilute it with water until there is probably 99 per cent. of water, and then it can be poured into the barrel of wax after it is melted. Don't put it in till after it is all boiled.

Mr. McEvoy: What proportion of sulphuric acid to the amount of wax?

Mr. Chrysler: I have used about half a pint to 200 pounds of dark wax. There is over fifty per cent. of the wax gathered from the beekeepers generally throughout the Province that the supply dealer has to refine to make foundation of. Wax is as particular a thing to melt up as honey. It can be spoiled by overheating the same as in liquefying granulated honey. Of course there is some wax that has been probably put in from dirty receptacles, and it is necessary to get it of a uniform quality in order to make foundation. Wax should be cooled very slowly. When heat is applied to wax or honey or any liquid from below there is a constant agitation. Wax, when left out to cool after it has been melted up, should be covered over thoroughly at the top especially, and the bottom really should cool first. Keep the top warm as long as possible. By keeping a certain heat above the wax while it is in liquid form you could have the impurities precipitated to a certain extent, and you will get very transparent and very nice wax.

With reference to the wax press, Mr. Byer spoke about different presses in use. I might say that the first press I had was from Mr. Gemmell. Mr. Hatch probably "hatched" it, and Mr. Gemmell made one and I bought it from him, and I thought I improved it. I suppose the press I have been using probably might be called the Hatch-Gemmell-Chrysler press, and I have succeeded very well with that. I did sell a great many of them, but I must tell you now I am not in the market for selling wax presses. Mr. Sibbald, I believe, probably made an improvement on it. In fact I made mine to work similar to his, but I find that my own will do just as good work with the amount of labor expended. I tried melting over slumgum last year, and we worked all day, and we get about one pound an hour from the slumgum, and that is the best we could do.

Mr. Byer: A number of bee-keepers wrote me last year in particular asking why they were troubled with such a depth of spongy matter at the bottom of the cakes of wax. I believe the main cause of that is in using hard water. Rain water is always preferable. The lime in hard water acts on the fatty matter wax contains; it is really a form of soap. If you use soft water or rain water you will find it makes a great difference in getting rid of that trouble. I have seen a cake of wax which would probably weigh about 35 pounds, and one-third of that was a spongy mass. I think a great deal of that was caused by using hard water. By allowing old combs to get wet they will deteriorate, and you will get a poor quality of wax.

O. L. Herschiser: When it comes to melted cappings I don't think you will find very much spongy matter in them, but if you are melting old combs that are partly decomposed you will find a good deal of that in the bottom regardless of the kind of water you use.

MR. HOLTERMANN: I have been fairly well satisfied that sponginess is the result of having hot water under the wax. Where the cooling is slow and the steam keeps rising under the wax that I believe is largely instrumental in getting that spongy condition. I do not think you ever find it when you use a solar wax extractor where no water is used.

There were one or two points spoken of there, and one was the bursting of the cheese in pressing out that wax. There are a good many who think that to apply very strong pressure is a great essential in the rendering of wax. I know probably there are quite a number who know it is not the case. I believe in the rendering of wax to get the most out of it one great feature is to tighten up the screw a little at a time and quite often to relax a little. You will find you have the pressure on and there is practically no wax coming from the cheese. When you loosen up a little there will be quite a little flow of wax, so that kind of work should not be done in too great a hurry. The less pressure you apply at the time the less danger of bursting that cheese.

In regard to the melting of old comb, I think it is important not to attempt to melt too much at a time.

We are pretty well agreed that the nicest wax that can be secured is by rendering it by means of the solar wax extractor, and, as in butter making, we know an article which was produced twenty years ago and found a market is to-day practically unmarketable. So I believe in wax craft. We will find from year to year, as we know more about the production of wax, we will have to be more careful as to the method in which it is rendered. I would not be surprised if the day would come when we would heat our wax very largely and melt the old comb even by means of solar heat, and then some method will be devised by means of which we can apply that screw to whatever matter there is and squeeze it out in that way.

JAS. ARMSTRONG: As to this sponginess, could it be brought back to the solid state, the same as the rest of the cake?

MR. BYER: Sometimes I have got the major part of it back, and it was fairly marketable wax.

MR. ARMSTRONG: If you put it in the solar wax extractor won't that settle the whole of that question?

MR. BYER: I have been told so. I have no personal experience.

MR. TIMBERS: Did I understand Mr. Byer to say if the cappings were wet it injured the wax?

MR. BYER: If they are allowed to stand in the water any considerable time. I do not know how long the water would have to stand on them till it spoiled them.

MORLEY PETTIT: There has been a reference made this afternoon by Mr. Byer which shows the importance of careful experimental work, and it touches pretty closely on my work, and that is the reference to the Sibbald press. I have had good success with the Sibbald press. I do not wish to cast any reflections on Mr. Byer's work at all, but it shows how one may go at a thing in a certain way and get good success, and another may go at it slightly differently and miss the point. He may miss the point intended by the inventor. I would be pleased to hear a word from Mr. Sibbald about the management of his press.

MR. SIBBALD: I can take everything Mr. Byer says good-naturedly, because I am not making money out of my press at all, except for the benefit I get in working it myself. The same gentleman that made his Gemmell press made mine, so there would not be any difference in the start off. However, I have got the Gemmell press in its entirety in my honey house now. I feel sorry for Mr. Byer, because the addition of water around the "cheese" is all the difference there is in the two presses. That hot water retains the heat and leaves the wax on the top and cleans off all the machinery of the press; it leaves all the slats clean and clear of wax, and it is a pleasure to take them out or do anything with them.

The principle of the two presses is the hot water principle as against the principle of putting slumgum in and letting the air cool it all around and fasten it on to everything it touches. The other is far cleaner and more easily done. I have used the same cheese cloths through a whole season and have done 600 pounds. Just by pressing and relaxing a little and pressing again and using your judgment you can work the cheese cloths all you want. You do not need anything stronger. With this press I got up I claim I can get through pretty nearly twice as much work as with the old one, because I use three cheeses instead of one. In the other press you had to put all in one; if you made it very thick you would not get good results. With the three small cheeses you should be able to hold three times as much as you ought to put in the other press. Then you can always use the water once or twice or three times in this press and in the other you would not be able to do that. I believe Mr. Byer gets better results from that press than anybody else I ever heard speak of it.

As to sulphuric acid, I can say my experience is the same as Mr. Byer's. In fact I sell wax, too, and I told the people to whom I sold I could clear that up perhaps a little brighter if I used something; they said, no, we would rather have it that way—we would rather not have sulphuric acid used.

The explanation Mr. Byer made regarding soft and hard water clearing the wax I do not think is quite right. I use hard water because it is handier, and I have used soft water to see if it was any better, and I could not really see any difference. I think that sponginess must come from some other cause.

Mr. Timbers: Did you have very much lime in that water?

Mr. Sibbald: I am not sure about that; it is ordinary hard water; it is a good well, and very good drinking water, and that is all I know about it.

Mr. Timbers: It is the lime that is in the hard water I believe that causes it.

Mr. Sibbald: A press should not hold more than an ordinary boiler full of water and slumgum, that is my opinion. You move it all in from the boiler into the press. In using the combs I just put them in an ordinary boiler and let the water boil in the boiler and shove in the combs. When we take it off we skim the wax and slumgum off the top. We do not try to get much water in cheeses at all. After we have got that all dipped off we pour the water right off the other side and pour it through a strainer, and if there happens to be any pollen or anything in it we will have it caught. This year in clarifying the wax I used a tall can about two and a half feet high, and it would hold about 30 pounds of wax, and the outer can held the water close to it and kept it from cooling. I could put the wax in there from the first melting in the morning and keep on putting it in there until I got 30 or 40 pounds melted, and as it would overflow out of the spout it would always be clarified—all cleaned; the heavy sediment would settle down. I have found that can a great help to me; it saved me remelting.

Mr. Byer: In regard to these presses. I want to say I do not know that many here have used the two presses. There are very few people that use both kinds of presses. I admit the principles are the same, and the theory is all right in Mr. Sibbald's press, but hour for hour I can melt more than double in good marketable shape with the Hatch-Gemmell press than with the Sibbald press. With the Hatch-Gemmell press, when we are through melting the wax, we have got it ready for the market except scraping the bottoms of the cakes off. Mr. Homer Burke rendered a lot of wax this summer, and he wrote me, "I have got both presses, and," he says, "one is for sale cheap." You can guess which one he meant.

Mr. Sibbald: I cannot for the life of me see how Mr. Byer can get the wax any cleaner from the Gemmell press than from mine.

Mr. Byer: Because it runs from the Hatch-Gemmell press right into the flaring tins, and they are set aside to cool; and with the hot water press you float it over; it does not form a perfect cake.

Mr. Sibbald: The wax floats to the top and the heavy sediment goes to the bottom. You have it separated right straight; you never get that sediment in the cake. With the Hatch-Gemmell the sediment and all comes out together.

Mr. McEvoy: You can all condemn acids as much as you like, but I am going to use a teaspoonful of sulphuric acid. Stir that in. I want about two inches of hot water in the bottom of the pail first, and in an instant it will settle all the sediment and dirt to the bottom. There is no one can produce nicer samples of wax than I do with a little acid, but do not use too much. You can make a nice job with the wax from old combs. You do not need it with cappings.

Mr. Timbers: When you send that to some man and he comes to test it, and he finds two per cent. of sulphuric acid in it and he sends it back, what do you do?

Mr. McEvoy: In some cases they won't use it, such as for piano polishing, but I will use a little acid, and I will get more for my wax as a rule.

Mr. Lowey: In any wax I have used I have always strained it. As soon as the wax is melted take it off and cover it up. If there is any sediment it is on the bottom, but there is no sponginess. I do not think the water makes any difference. I never found sponginess from the water. I have had the water so warm that 24 hours afterwards you could not put your hand in it.

Mr. Holtermann: I have never yet succeeded the first time with a Hatch-Gemmell wax press in getting a cake that is fit for the market. If there is any one can do it I would like to hear how it is done.

Mr. Newton: I do not believe in all that has been said: that is natural, I suppose. Mr. McEvoy rose to say he did not believe but what supply men and foundation makers used a certain percentage of acids in cleansing dirty wax. I can say I have made foundation for at least twelve to fifteen years and I have not yet seen a bit of acid on my place. I do not think it is necessary to use it. I believe in the first place we lose a considerable amount of wax in the use of acids. I believe the capping wax myself is too hard to make No. 1 foundation, but I believe in a little blending which will help matters out for bee-keepers and for the bees also.

Mr. McEvoy: I cannot agree with Mr. Newton in the blending of wax. When I send nice white wax I want that back.

Mr. Newton: Mr. McEvoy never got blended wax back from me; he got just what he sent. But, with lots of wax that comes in, if I had my way of doing it, I would prefer blending, and you would get nicer foundations, and it would be taken more readily by the bees.

Mr. Timbers: Which can you make the best foundation from, a bright, soft, yellow wax or a hard wax from cappings?

Mr. Newton: I can tell you which is the hardest to make. I do not know that there is practically very much difference except in the work. Capping wax is certainly harder to make. More pressure is accordingly needed to do it. I do not know that one can make any nicer foundation from one than the other. It has been harder work to make foundation the last few years than ever before.

Mr. Timbers: Will hard wax make a more brittle foundation?

Mr. Newton: Sure.

QUESTION DRAWER.

Q.—*What is a colony of bees worth?*

Mr. Byer: For a colony in good condition in the spring you would ask about five or six dollars.

Mr. Chrysler: I believe a colony of bees is worth an acre of land.

Mr. Lowey: In my vicinity there were 30 colonies of bees sold, and they got a dollar a colony. It makes a difference whether those who own them read our literature and attend our Conventions. They asked me what they were worth, and I told them at least $5.

Q.—*When do you clip your queens' wings?*

Mr. Timbers: I always clip mine just before fruit bloom. In the last two years I have not clipped queens at all except on the run. I like that way best.

Q.—*Does it pay to re-queen every year?*

Mr. Pettit: So much depends on circumstances. I think that a queen should not go through more than two seasons, and if we have two seasons in one year, one year is as long as we should keep her. That is, if we have a white honey season and a dark honey season following it. If we only had the white honey season I would not object to keeping her the second year, but not longer that that under any circumstances except for special breeding purposes.

Q.—*Is the huckleberry bloom a honey plant?*

Mr. Herschiser: There is a bee-keeper down in Cape Cod, Mr. Allen Latham, who has his bees in a poor locality, and I guess he is a pretty good bee-keeper, and I saw some reference to his honey resources, and among them was mentioned the huckleberry. I have wondered whether the huckleberry might not be a pretty good flower for the production of honey, the same as the raspberry is in other localities. I have a few bees not very far from a large huckleberry marsh, and last spring while my bees were already building up as the result of spring dwindling, another bee-keeper that lived only six or eight miles from me, and apparently subjected to the same winter conditions, had his bees swarming and gathering white honey, and they were right adjacent to a huckleberry marsh. This huckleberry marsh has what they call the high and low berry bush. The low bush is not much higher than the strawberry plant, and there are bushes considerably higher than a man's head. They were all swamp huckleberries.

Q.—*What is the best way to feed for winter, and is it too late to feed now?*

Mr. Chrysler: Yes, too late excepting you put in full combs of sealed honey. In cases where it has been unavoidably left over, candy made from granulated sugar in cakes put over the frames will answer. I always let the syrup boil till it gets to a certain consistency, and stirring it or probably mixing a small quantity of honey in it and pouring it in pans about eight by twelve inches, and an inch to an inch and a half in depth, and caking it in them and then putting it over the frames. It is difficult at this time of the year to get bees to take syrup that is thick enough. Of course it may be done. One aid to that would be to have the bees well packed and warm, and if mild weather comes they will take it down in cases where they would not otherwise.

Mr. Timbers: Won't they take it up a great deal more in colder weather than they will take it down?

Mr. Pettit: There is a method that I have seen practiced this fall that is very successful, and by means of which I think bees will take feed real late. Take a two-quart sealer and get a disk of perforated tin with very fine perforations, and put that in place of the glass on top of the sealer, and have holes in the top of the honey board that will just fit this sealer top. Turn your sealer upside down over that so that the bees can feed through the perforated top. The holes are so small the syrup will not run out, and the pressure of the air holds it in the jar. The bees can suck it down with their tongues through the openings, and they do not need to leave the cluster at all. If the bees are in packing cases I do not know how late they can take it, but I know of a yard that is being fed this week quite successfully in this way.

Mr. Herschiser: I have done considerable feeding in one or two seasons in the manner described by Mr. Pettit, both outdoors and in the cellar, and they will take the feed right along. They get the feed so near to them they do not need to break the cluster. I do not use perforated tin. I use a piece of cheesecloth and screw the rim down over that.

Mr. Eyre: One thickness of cheesecloth?

Mr. Herschiser: That is sufficient. If the mouth of the jar is very large it might not be sufficient. You can experiment with water to find out.

Mr. McEvoy: When the weather continues favourable it is no great trick to feed. I always like to have everything fed up complete by the 15th September, but some twenty odd years ago I set a crate under a tin pan filled with straw. It came up very close to the frame, and I put in the feed in the night when there was a white frost, and these frames were within about three eighths of an inch of the syrup, and it would surprise you what they would take up in a night. You can feed up a hive now in first-rate shape by putting the feed in hot.

Alex. Dickson: I have been feeding less or more for the last twenty-seven years, and I have tried every plan. One of my neighbours came to me one day and threw down rather a rough looking box and said: "What do you think of that?" He told me it was a feeder. I have tried it the last three years, and I experimented two years ago to see how late I could feed. I fed twenty pounds with the temperature down to eight degrees. I lined the box with a slatted float, and the bees will take up the feed in a hurry. There is no better feeder. I have had them take up 25 pounds in one night, but, as Mr. McEvoy says, feed before the end of September. I place the feeder in the bottom of the cluster. If you line them with tin you must paint the tin because the surface is too slippery.

H. E. Eyre: I tried to feed a swarm I had about four weeks ago, and they would not have anything to do with it. I tried it about ten days ago, and they took it down, lots of it. I thought perhaps they might have had some of their comb occupied with brood and had not room for it, and after they got through they were willing to do something with it.

Mr. Armstrong: Nearly every bee-keeper here I suppose has got a five or ten pound tin. He can perforate the cover of that and make as good a feeder as he needs. Turn it upside down over an opening at the top, and you can feed the bees at any time. Feed it warm. You do not want to get your sugar so that it will candy. I have had them take down in just such weather as you have got to-day sixteen pounds in fourteen hours. The syrup I have been using for a number of years is two to one by weight.

Mr. Byer: I want to call attention to the fact that it is extremely unwise and risky to leave off feeding till this time of the year. Different locations and different honey flows make a difference. I finished up feeding this year about the 16th October.

Q.—*Which is the best race of bees?*

Mr. McEvoy: The Italians, decidedly.

Q.—*Don't you think the presence of honey in wax causes a spongy condition?*

Mr. Byer: Yes, it will.

Mr. Herschiser: A great many of you have melted up cappings that had considerable honey in them, and when the wax comes to cool you find a nice solid cake of wax without any spongy condition.

Mr. Byer: It is a different thing with combs full of honey. In cases of foul brood I have seen where they had a whole lot of honey, and I have yet to see the first case where they did not have spongy cakes.

Mr. Herschiser: I would not attribute the sponginess to the presence of honey.

Mr. Lowey: After I have taken the wax off I have had the water taste and look and smell like syrup, but no sign of sponginess about the wax.

Q.—*What will be the effect of honey-dew on wintering?*

The President: Sure death.

Mr. Herschiser: I have a couple of yards of bees that have considerable honey-dew in them that I expect to winter pretty well, and the reason I expect it is because the honey-dew is on the outside combs of the hive. They were quite full of brood at the time the honey-dew was gathered. Since the honey-dew was gathered there has been quite a quantity of buckwheat and aster and golden rod honey put in, and I notice that some advise the feeding of sugar to fill the centre of the brood nest with a food that the bees will eat before they get to the honey-dew, and I think that condition is met where the bees have gathered buckwheat or other good wintering honey and left the honey-dew on the outside where it will be used last, towards spring.

Mr. Atkinson: How do you know it is honey-dew?

Mr. Herschiser: I know by the description, and by the fact that in the season when I should have been getting white clover honey and basswood I did not get it. It was a smoky colour, with a slightly unpleasant taste. I do not know whether it is honey-dew or not, but I have every reason to believe it is.

Mr. Atkinson: How are you sure you have not got honey-dew in the dark buckwheat?

Mr. Herschiser: I have read somewhere that there is no honey-dew gathered after late in June.

Mr. Atkinson: My experience here is that in a season where it is coming in it seems to come in more or less the whole season through. We have had an experience in our section something the same as Mr. Herschiser did with this honey-dew. Three years ago we got quite a crop, and in colour it was dark, and quite thick in body like blackstrap. I was out to the bush when I heard the bees hum, and found they were working on the inside of the leaves, and wherever you would see them working there were insects there, and that is the kind of honey Mr. Herschiser got.

Mr. Herschiser: That is what I call honey-dew.

A Member: Would it not be a little bit easier than to attempt to extract from the brood nest at this time, to fill the central portion of the brood nest from which the bees have recently hatched, with a good thick syrup made of two to one, then they would live through the winter on this thick syrup put into the place where they could get it easier and not get the bad stuff till they were getting flights in the spring, when they would be perfectly safe?

Mr. McEvoy: I would get that stuff out of the hive.

Mr. Herschiser: I am not going to extract mine or feed them; they are pretty heavy, and I will be able to tell you in about a year from now whether Mr. McEvoy is right.

Mr. Timbers: I would take out combs from the centre and feed them from underneath.

Mr. Atkinson: What is the taste of honey-dew if it is pure?

Mr. Timbers: It tastes a good deal like scorched syrup.

Q.—*Did any bee-keeper ever winter on beet sugar syrup? If so, kindly state results.*

A Member: I went in on it last year, and the bees wintered well; it was Wallaceburg beet sugar.

Mr. Storer: I think you want a good deal more beet sugar to the weight than of cane sugar.

Q.—*How can this Association be made more profitable?*

Mr. Miller: I think through the affiliated societies. The effort is being made there, and I think it has resulted in good. There are many ways that might be suggested. Through discussion there may be something brought out.

Mr. Herschiser: Mr. President, I think the thing that will appeal to bee-keepers and get them to join an association more than anything else is to get them to feel that the association is doing them some good. That will make the Association profitable.

The President: How can you make them believe it is doing good?

Mr. Herschiser: By argument. I think the Crop Committee of this Association is the thing that will do the Association more good than anything else, if you can get the Association to stand by it. When the Committee have made a report and then various members of the Association begin to try to bear the prices down, it does not result in any good to them. Every bee-keeper should make the price which the Honey Committee fixes his price. How can you get them to do that? Just as soon as a bee-keeper makes an offer of honey at the price he thinks it ought to bring, then the buyer begins to enquire around amongst the bee-keepers, and if he can get the seller to cut down the price, then that causes a break right away. I have thought an association could do a great deal of good for its members if the Crop Committee could resolve itself into a sort of information bureau to recommend to large users of honey the honey of members of the Association, and get them to purchase at the prices that the Committee recommends.

Q.—*What is the best way to treat old combs containing dead bees and pollen? We have known some to place them in tubs of water and then shake or jar out the bees.*

Mr. Timbers: The pollen can easily be soaked and gotten out. You do not need to bother about the dead bees; the bees will clean them out themselves.

Q.—*Is the tough dark substance or sediment under cakes of wax of any value?*

Mr. Herschiser: The way I treat this tough dark substance and all other substances that I scrape off the bottom of the cakes of wax is to keep accumulating it till I get quite a lot of it, then melt it up and get quite a bit of wax out of it.

With reference to the use of sulphuric acid, there is quite a strong feeling among a good many bee-keepers against its use, and I know there are some that use it and with success, and I am one of that number. I have probably had as much experience in rendering up old combs and slumgum as any other bee-keeper. I take a batch of wax, five gallons and a dessert spoonful of raw sulphuric acid without any diluting. I have two or three inches of water in the pan, and I put the acid right in the melted wax and begin stirring, and stir for two or three minutes, and it will bring out the colour and make it nice and bright. Sulphuric acid is very sour, and if there is any taste in the wax you can easily detect it by chewing a little of the wax, and unless you use a lot of it you won't find any taste in it; it goes into the water. The capping wax I do not treat with acid, only the dark coloured wax. I sell a good deal to foundation makers; and I remember one time the Root Company's representatives stopped at my place, and I had about 1,100 pounds of wax, and the most of it I had treated with acid. I shipped it to them at the highest price and they wanted more. If properly treated, sulphuric acid will not injure the wax, but make it better. I have sold a good deal of wax to concerns that use it for silver plating, and never had any complaint about it.

Q.—*After scraping the section frames and hives can good clear wax, free from propolis, be obtained from the scrapings?*

Mr. Armstrong: I would say yes.

F. P. Adams: I have never had much experience in putting through clear propolis, but propolis mixed with slumgum and old combs seems to separate very nicely.

Mr. Herschiser: Nearly all propolis and scrapings from sections and frames contains a good deal of wax, and you can get just as nice wax out of it as you can from pure cappings. The propolis is much heavier than wax, and it will separate, and is about 40 or 50 per cent. pure wax. This propolis is a good deal like so much varnish, it will go to the bottom, and be in little shiny particles and collect in the bottom of the can.

Mr. Timbers: My wife fills the boiler three parts full of water, and then lets the wax stand in the water to cool, and the propolis goes to the bottom in a chunk, and the wax is clear on top.

Mr. George Henry, Oriole, Warden of the County of York, then gave a hearty address of welcome to the Convention, in which he paid a tribute to the importance of the honey industry.

The President thanked Warden Henry for his kind welcome.

REPORT OF HONEY CROP COMMITTEE.

Toronto, August 3rd, 1909.

The Honey Exchange Committee of the Ontario Beekeepers' Association met at the Secretary's office in Toronto to-day. Reports were received from a large number of points throughout the Province, covering about 15,000 colonies, and the Committee were enabled to get accurate figures for comparison with previous years.

It was found that the average production per colony the present season was 59 lbs. as against 55 last year. The honey is of much better quality throughout, and a greater consumption may be looked for. All old honey is practically cleared up both here and in other Provinces. With a light crop only in the United States, and a greater demand in the West due to this fact and also to a good harvest, much more Ontario honey should find a market there at reasonable prices both to producer and consumer.

The lower prices of fruit in Ontario due to large crops and the slight increase in production of honey mentioned above warrant the Committee in recommending a reduction in the prices both for extracted and comb to the following:

No. 1 Light Extracted (wholesale), 9½c. to 10½c. per lb.
No. 1 Light Extracted (retail) 12½c. per lb.
No. 1 Comb (wholesale) $1.80 to $2.25 per dozen.
No. 2 Comb (wholesale) $1.50 to $1.75 per dozen.

The Committee would suggest to the bee-keepers to retain a portion of their crop until later in the season, so as to more equitably distribute the honey throughout the season and supply the later demand which will ensue as a result of the splendid quality of this year's crop.

September, 8th, 1909.

The Committee met at the Exhibition Grounds this afternoon and examined the reports as received to date in respect to the buckwheat honey crop and prices received for white honey. The crop of dark honey is good but the Committee find that the markets are clear of last year's crop and buying freely already. The following prices for dark honey are advised:

Wholesale 6 to 6½c. per lb.
Retail 7½ to 8½c. per lb.

A number of the largest producers have already sold at these figures.

In regard to white honey, the Committee find that the prices sent out in their previous report are being fully realized, and think that those still holding part of their crop should receive these prices without difficulty. Practically everything has been sold at from 10c. to 11c. Peel and Halton report most of light honey disposed of, much of it going to the Northwest.

Mr. Sibbald: The Crop Committee met this year about the 4th of August, and found more reports from the bee-keepers than ever before. That goes to show that the bee-keepers are appreciating the work and have confidence in the Committee and have taken the trouble to send in their report cards filled out; and of course you all know the more reports we get the more accurately we can figure out what the crop is. Taking that in connection with other conditions it helps us a great deal to arrive at a right and proper price. Some people say we are too late and some say we are too early in holding our meeting. I hardly know how we could do differently, because in the warmer parts of the Province it is earlier than it is north, and while they know a week or two ahead what their crop is, the other fellows can only guess at it. We try each year to size it up and let the Secretary know when we think it would be wise to send out the cards.

The fall report this year we made at Exhibition time and looked over the cards and found that buckwheat honey is showing an increase in the Province each year. I think the acreage of buckwheat will greatly increase. It is a profitable crop. That is the decision people come to wherever they grow it.

We got from a number of bee-keepers this year an estimate of what honey they would have to sell in a wholesale way, and our Secretary sent that to a number of firms that were enquiring for honey, giving the price, and I think he gave the number of pounds these people had. I for one object to that, and I intended to mention it to the Secretary. I do not think he ought to send the number of pounds that anybody has for sale. It will be enough to give the dealers the names of those having honey for sale and let them correspond, because the dealers make use of all these things in a way we do not intend.

Then we mentioned honey being in demand in the West this year, and some have criticized us for that and thought we drew too much attention to the West. The reason we did that was to make the bee-keepers feel a little more confident, because we thought there would be a large demand for honey in the West, and we wanted to let the people know where the honey would be likely to go so that they would not feel like taking a lower price. There was a feeling that honey would come down this year, and we could not see any very good reason why it should be much lower. The market was bare, and when you find a bare market it takes a large production to over-stock it. That has been my experience. I do not know whether our Committee on Transportation could get any better rates to the West or not; if they could it would help wonderfully; and then there is a north country opening up in the mining districts, and a tremendous lot of honey this year going north; and if we could get better freight rates north it would help.

I have heard this year great praise for that corrugated package that they are getting out for shipping comb honey. One dealer in the city told me he had sent a lot of honey to Cobalt, and it went perfectly safe, and it might be well for the bee-keepers to look up that package for comb honey and see how it would suit. It has been a great drawback to comb honey that we could not ship it without quite a bit of loss and danger.

J. D. Evans, Islington: I do not think the freight rate on honey to the West and Manitoba is unreasonable. I have shipped honey out there at a cost of two cents a pound for liquid honey, but the express rates on liquid or candied honey in Ontario are enormous. I sent a 25 pound can down to Ottawa to my son by express, and it cost me 75 cents. I do not know anything about the rates on comb honey.

Mr. Sibbald: The rate on comb honey is first class, and if we could get a package that would carry comb honey, very well—this corrugated package might do that—then perhaps we might approach them, and get second class rates on comb honey, and that would help the comb honey situation.

A short discussion then ensued with reference to whether it was advisable for the Committee or the Secretary to give to dealers particulars of the amount of honey that bee-keepers had for sale. The feeling of the majority was that it was unwise to do this, while some thought it was a good thing as it enabled the dealer to know where he could get a large amount of honey if he desired to do so, without first going to the small bee-keeper and finding he had not a sufficient amount to supply him.

All who spoke were unanimous in their praise of the work of the Secretary and Committee. The discussion was participated in by Messrs. Chrysler, Timbers, McEvoy, Dickson, Grainger, Adams, Holtermann, Lowey, Byer, Herschiser, Holmes, Evans, and Galbraith, after which Mr. McEvoy moved, seconded by Mr. Evans, that the Crop Report Committee do not hereafter send out to dealers the quantities of honey that bee-keepers hold. Carried.

SOME FEATURES OF MY YEAR'S WORK.

By Morley Pettit, Provincial Apiarist, Jordan Harbour.

The Provincial Apiarist was appointed by the Ontario Department of Agriculture to promote the interests of the bee keeping industry in the Province of Ontario. His duties began April 1st of the present year, part of each week to be spent in experimental work and part in the inspection of apiaries and in lecturing in Apiculture at the Ontario Agricultural College, Guelph.

His first duty was to secure bees for the Experimental Apiary which was to be established at the Horticultural Experiment Station, Jordan Harbour. The points to be considered in selecting colonies of bees for this work had reference to the general conditions of the bees and hives. The hives should be of standard make, preferably Langstroth, with straight combs. The bees should be pure bred Italian, free from disease, and in good condition as to queen and strength of colony. After considerable correspondence, twenty-five colonies of pure bred Italian bees in ten frame Langstroth hives with twenty-five extracting supers, containing new wired combs, also a number of comb honey supers, were purchased from Mr. F. P. Adams, Brantford. As Mr. Adams had wintered his bees out of doors, and as their strength was considerably reduced by the exceptionally late spring, it was thought advisable not to unpack them for moving until settled warm weather, about the 1st of June. At that time they were moved to the Experimental Station, and worked for extracted honey and increase. The confusion of getting the bees moved and settled, getting the building up, and other things in shape left very little time for experimental work.

A start was made, however, by finding out what had already been done at experiment stations to avoid needlessly going over ground that had been fully covered. For this purpose a circular letter was sent to all the Agricultural Experiment Stations in Canada and the United States Most of these report that they are doing nothing with bees. A few had done some work with bees years ago, but had dropped it through pressure of other things. The Central Experimental Farm at Ottawa did some work under the direction of Mr. John Fixter, on which he has reported to this Association at former Conventions.

The Michigan Experiment Station reports that a large amount of work had been done from 1870 to 1894. Since that time practically nothing has been done and the Institution has not been keeping a stock of bees for about ten years.

The Kentucky Agricultural Experiment Station reports that they have been experimenting with two varieties of bees the Cyprians and the Carnolian, for some years, but have published nothing in the form of a bulletin.

Mr. G. M. Bentley, Assistant State Entomologist, Knoxville, Tenn., writes as follows: "We have kept bees at the University Farm for the past three years. Our main purpose has been to determine which honey bee would do best in this locality, and the amount of attention necessary to give bees in order to get the best returns. We have been handicapped in the work by lack of means and time to devote to this kind of work. The apiary has been successful, and has been the means of creating a great deal of interest in bee-keeping throughout the State."

At the Maryland Agricultural College the State Entomologist has done some work on the subject, and is trying to determine the benefit of bees in pollenization of fruits and other crops.

Mr. E. E. Scholl, Assistant in Charge of Apiculture at Texas Agricultural College, writes as follows: "The work under way at the College Apiary at the present time consists of the following: A study of the bee diseases of the State, conducted by Louis H. Scholl, District Foul Brood Inspector. A study of honey-yielding plants in different localities. This is done principally by our travelling assistants. The production of honey vinegar from the poorer grades of honey and washings. The method used is that followed out in Arizona by Prof. Vincent. Comparing the different strains of bees as to the best honey gatherers is another line of work. The study of the value of concrete bottoms in localities where the wooden bottom boards will not withstand moisture and other conditions. The planting of various honey plants to determine the value of such plants in a barren locality. We have tried Buckwheat, Rocky Mountain Bee Plant, Cow Peas and Sweet Clover. They have all proven successful. Besides we have made tests of bottling honey at different temperatures to determine the exact temperature at which the honey will keep from granulating. These are some of the experiments we are trying now. I will give you the results at a later date."

Several of the States have issued bulletins on the status of Bee-Keeping and bee diseases; but by far the most extensive work is being done by E. F. Phillips, Ph.D., in charge of Apiculture, United States Department of Agriculture, Washington, D.C. In reply to the circular letter Dr. Phillips sends a six-page letter out-lining his work from which the following has been condensed:

Dear Mr. Pettit.—I am very glad to hear that a new Experimental Apiary is to be established by the Ontario Government and I congratulate you on your appointment as Superintendent. I may say first of all, that I shall be very glad to co-operate with you in every way possible, and if I can help you any it will be a pleasure. It will be an advantage to both of us if we can co-operate in the work.

To give you an outline of our work is something of a task, but I shall summarize the various projects from my last Annual Report and add explamatory remarks as they present themselves.

Bee Disease Investigation. The causes of the two contagious diseases have been studied and it has been definitely established that *Bacillus larvae* is the cause of American foul brood. The cause of European foul brood is not known, but various microörganisms found in brood dead of this cause have been studied. We expect to continue this work and this summer particularly to study the distribution of the diseases in the United States. A bulletin is in preparation giving a summary of the work in bacteriology that has been done here and elsewhere. Last summer extensive experiments in treatment were carried on and this will be continued this season.

The object is to find the cheapest method of successful treatment, and if shaking proves to be the only effectual method, then to find the most effectual time and method of shaking. The results so far are very significant.

Races of Bees. The Bureau formerly distributed queens of various races of bees. This has been discontinued and I do not believe that the work is at all valuable. We keep on hand lists of breeders of various races and in case of inquiry give the names of at least four nearest the applicant. No partiality is shown any breeder.

HONEY ANALYSIS. In co-operation with the Bureau of Chemistry we are having analysis of honey made and, this is now being done on honeys imported into the United States.

WAX ANALYSIS. The same thing is just being begun with wax. Market conditions are also being studied as well as wax production, uses of wax, etc.

ACTIVITY OF A COLONY. Last year we had a hive on scales for an entire year with weighings every hour during the day and all night for three days a month. Readings were also made of five thermometers inside the hive, one at the entrance (inside) and one outside. The results are now being tabulated. It is remarkable what all can be gathered from such data.

STUDY OF THE STATUS OF BEE-KEEPING. I enclose some blanks which were used in gathering and tabulating reports of bee-keepers. Our work in Massachusetts is now in press and similar work is being done in Maryland, Pennsylvania and Virginia. This is the means of sending out great quantities of our literature and locates lots of diseases. It also enables us to find out the conditions of bee-keeping quite well. The labour of this work is enormous.

ANATOMY. The anatomy of the bee has never been described in a satisfactory manner, and the books in common use are full of errors. We expect soon to publish an extensive bulletin on this subject, illustrated by about one hundred drawings made from the bee and not copied from some other book.

EMBRYOLOGY. The development of the bee is very imperfectly understood, and seems to me to be of great importance. For this reason this is being studied by a man thoroughly trained in his work.

BEHAVIOUR. It has long seemed to me that the greatest need of the practical bee-keepers was a more intimate knowledge of the behaviour of bees. Too many of them work by rules that some one else has laid down. Too many of our manipulations are not fully understood. We propose, therefore, to make a very detailed study of bee activity and shall try to find out the basic outlines of bee behaviour.

BIBLIOGRAPHY. The literature on bees and bee-keeping is so extensive that it is very difficult to cover the ground. To aid in our work here we are making a bibliography by books and papers on this subject. This has been going on for about a year and a half and we now have at least 15,000 titles arranged according to authors and subjects.

TRANSLATIONS. When an article in a foreign language is important, and will be needed frequently for reference it is translated, copied and filed.

There is so much to do that we welcome help from Canada."

Truly yours,
E. F. PHILLIPS.

Work along some of these lines has been begun by the Ontario Provincial Apiarist, and as the equipment grows some really valuable results can be obtained for the benefit of Ontario Bee-keepers.

Two hives of bees were placed in the windows of the office at the Experiment Station with flight opening through the window sash, one small colony in a Root observation hive and the other a good average colony in a ten-frame Langstroth hive placed on scales and weighed morning, noon and night for about two months beginning the 24th of June.

These weights have been tabulated in parallel columns with morning and evening weather report of the Experiment Station. A series of such record covering a term of years would give some idea of the influence of weather conditions on the working of bees and the nectar secretion of blossoms. Of course no definite conclusions can be drawn from the records of one season. It might be said in a general way that the greatest daily increase of weight was 13½ pounds on June 28th. The day was fine and clear with south breeze and a temperature rising from 61 degrees to 81 degrees during the day and dropping to 60 during the next night.

On the night of July 2nd, a thunder storm followed by strong N. wind and a fall of temperature to 56 degrees on the 3rd, cut off the honey flow so it was only spasmodic until it dropped to practically nothing after the 9th of the month. The eight days preceding July 2nd gave an increase in weight of eighty pounds.

Another feature of these results is the fact that the morning weight was always less than that of the night before. This might be ascribed to the evaporation of nectar; but the loss in weight was not found to be in proportion to the previous day's gain, in fact it continued to range between one and two pounds nightly until the night's loss was greater than the previous day's gain, and the hive was found to be weighing less from day to day.

Comb Building. It is of practical interest to bee-keepers to know how much wax from the foundation is built in the cell walls of the comb. To test this, five pounds of medium brood foundation were secured from Messrs. Ham & Nott which they had coloured black with a vegetable dye. It was placed in wired frames and given to the bees, some in extracting supers and some in brood chambers. The results varied according to the strength of the colony and the honey flow. In some cases the resultant comb was coloured clear to the ends of the cells. In others it was shaded off to white at the outer ends of the cells. Apparently about one-half of the cell walls was composed of the original foundation wax.

Testing Appliances. In comb honey production, samples of the following were received: The Bachmann Comb Honey Super, The Crane Cellular Paper Shipping Case, The Wire Cloth Separator, but owing to pressure of other duties no comb honey was produced this season and these could not be tested.

In extracted honey production the wire queen excluder, manufactured by the A. I. Root Co., was found very satisfactory and an improvement on the old style perforated metal.

An uncapping knife received from Mr. W. A. Chrysler, Chatham, is a decided improvement on the bevelled knife with offset handle in common use. It is nothing but a straight handled carving knife with blade about twelve inches long and an inch and a quarter wide. This will reach clear across a Langstroth comb with handle clear to uncap with one strong stroke. The blade should be very stiff and not too wide.

Uncapping Machines. An effort is being made to secure samples of uncapping machines, but so far the correspondence has been one of hopes deferred. The Canadian machine, invented by Mr. William Bayless, of Brantford, is not being manufactured for sale.

Mr. A. C. Miller, who has extensively advertised a decapper, promised one of his machines to the Experiment Station early in the season, but so far the correspondence has ended in promises. The other inventors in the United States were corresponded with, but were too busy to make machines for use in Canada at present.

Capping Melter. Two machines were tested. One made by Mr. Behune, of Australia, and the other by the A. I. Root Co. The former consists of square tin steam pipes placed horizontally with their corners together, one-eighth inch apart, on which the cappings are placed. When melted the liquid is expected to pass down through these ⅛″ spaces into separating pen which is kept warm. The other machine is built on the double boiler principle with outlet through coarse and fine wire cloth strainer for the wax and honey you run off as fast as liquefied. The rendering of wax and honey from cappings is a difficult matter.

The problem is to separate them in a practical way without injuring either. The only known method is to apply heat until both are sufficiently melted to separate by gravity.

The simplest device for this purpose is the solar wax extractor. It separates the wax and honey most successfully, but it injures both the colour and flavour of the honey.

It is also rather slow on account of the uncertainty of sunshine, and requires attention at a time when other apicultural work presses the heaviest. Another method which has not the latter objection is to drain the cappings well and pack away in barrels till winter, then wash out the honey with water and melt down the wax into a cake. The objection to this is that the honey either is lost or must be made into vinegar. The latter is a line by itself into which most apiarists do not care to go.

It is most desirable to save both honey and wax in their commercial form uninjured. Honey is injured by heat in proportion to the number of degrees of temperature and the length of time heat is applied. Hence the question is to devise mechanical means for getting the liquified mixture away into the separating pan as quickly as possible. The obstacle in the way of accomplishing this easily is the refuse matter always contained in the cappings. If all would melt it would be comparatively easy to draw off the liquid as fast as it forms. The Behune melter, for example, would answer the purpose nicely, but as it is, the spaces between the steam pipes soon clog with refuse, which tends to hold back the liquid until the honey is injured. The same difficulty is found with the Root melter. The strainer soon clogs. Another great trouble with the latter is the comparatively small melting surface and the very small outlet. The great mass of cappings does not touch the heat, and the liquid that forms is held back from the outlet by what is yet unmelted. Further the outlet is into cold air which can come in and cool the whole strainer.

For melting cappings in bulk the Root capping melter is perhaps the best that has been brought before the public as yet. Still it will be greatly improved when these objections can be overcome. To use it according to instructions as an uncapping can with a heated oil stove in the extracting room is not pleasant in hot weather. In fact many would not use it for this reason except on real cool days. This work will be continued with the hope of discovering some practical method of separating the honey and wax without injury to either.

RETURNS FROM THE APIARY. The 25 colonies with which the season opened were increased to 38. The honey crop amounted to 1,750 pounds of extracted honey, all of which except about 100 pounds is white clover and alsike. About 200 new combs were built on wired foundation.

EXPENDITURE. About $780 have been spent for bees and equipment at the Experimental Apiary.

RACES OF BEES. The Inspector on his rounds is asked every day where good queens can be secured. The Inspector is not supposed to be an advertising medium yet he should be able to give expert advice in all such things. The Provincial Apiarist has received queens from two different Canadian queen breeders and introduced them to nuclei. In another year he will be able to report on their merits.

PROBLEMS TO BE WORKED OUT. The greatest problems which confront the practical bee-keeper are wintering, spring management and swarm control. Another question which has been taking a prominent place in the *Bee Journal* during the past season is one which is worthy of consideration, and that is "What conditions affect the working of colonies of normal strength?"

Some of the conditions are:—(1) The race of bees. (2) The strain of bees. (3) Numerical strength of colonies. (4) The age of working bees. (5) The age of the queen. (By age of queen we mean the amount of egg laying she has done.) (6) Nervous condition of bees. (7) Honey bearing flora of the neighbourhood. (8) Weather conditions.

There are many others which only patient observation and experiment will discover. These lines of work will be taken up as rapidly as time and equipment will permit.

THE LIBRARY. The nucleus has been formed of a library of bee literature with all the standard works on the subject and complete files of all the magazines published in the English language. These are in process of collection, and the leading articles are being indexed. Besides the magazines published in English a number of standard French magazines are being received. As some of these files are incomplete in back numbers, contributions by members of this association or others would be greatly appreciated. It is proposed to continue the work of collecting and indexing until the Provincial library of apiculture is made most complete.

STATUS OF BEEKEEPING. A great deal of assistance can be rendered the bee-keepers of the Province if their names and addresses are known to the department. The Provincial Apiarist is making it a part of his work to compile a card index of all the bee-keepers of the Province with the name of their post office, township, and county, with the number of colonies of bees kept and any other information of value. These cards are in duplicate. One set is indexed according to the names of bee-keepers and the other according to counties and townships.

There is a movement on foot in the Department of Agriculture to transfer the experimental apiary to the Ontario Agricultural College, Guelph, leaving a commercial apiary at the Horticultural Experiment Station, Jordan Harbour, centralizing the provincial work in apiculture where the other agricultural work is centralized and where the students are.

WORK AT ONTARIO AGRICULTURAL COLLEGE. It is one of the duties of the Provincial Apiarist to deliver a course of lectures in apiculture to the students of the O. A. C. At present this is confined to two lectures per week to the first year class during the fall term. This class is composed of men of all nationalities and degrees of educational training up to college and university graduates. Most of them know nothing of bees. The majority do not expect to engage in bee-keeping. Yet no agricultural education is complete without some knowledge of the habits and management of these most useful insects. As this is the only work in the subject the students get in their whole course it is necessary to decide carefully what phase of the subject which can be presented in a short lecture course will be of most value to them. The following plan was decided on:

First the attention of the class was secured by showing the practical value of the subject in hand. Bee-keeping is one of the most pleasant, healthful and profitable of all lines of agriculture. Pleasant because of the mysteries and problems of the teeming insect population of the hive with their varied interests and ambitions, because duties connected with it are mostly out of doors in pleasant weather and indoors when the weather is bad, because it is mostly clean light work. It is healthful for the same reasons and because the product is the purest and most wholesome of sweets. The greatest value of bees is without doubt the fertilization of fruit and seed blossoms. Also the apiarist with the expenditure of some labor and considerable experience receives for his cash investment dividends of from 50 to 75 per cent. On the other hand, a large percentage of those engaged in bee-keeping fail for lack of experience and good management. This can be overcome only by thorough education and training in the subject. These young men who have given their labor in the apiaries of successful bee-keepers, sometimes even paying their own board, have found it most profitable to them in after years, when managing their own apiaries, as some of the members of this Association can testify. It is now fully time that an opportunity for such instruction and experience should be given the students of the O.A.C. A four year course in apiculture with the right man in charge and fully equipped apiaries, laboratory, class-room, winter repositories, etc., etc., would put men in the way of becoming successful apiarists, assistants, and foremen in apiaries, inspectors of apiaries, queen breeders, instructors, experimentalists and experts in all lines of Apiculture.

After showing some of the advantages, the attention of the class was called to some of the difficulties of practical apiculture. In beginning any study one must first of all see that it *is* a study:

(*a*) See that it has problems.

(*b*) See clearly what the problems are.

(*c*) Learn what has been done by others towards solving them.

(*d*) Test the conclusions of others by experiment and experience.

(*e*) Draw original conclusions and build on whatever solid foundation has been laid by those who have gone before.

To direct attention to the leading problems of the business an imaginary visit was paid to an apiary in early spring and the varied conditions of the colonies was used to illustrate the difficulty of wintering bees with uniform success. This showed the class that the wintering problem for example is a very real one. Then the changing seasons were brought into rapid review, and each shown to have its special difficulties in management. The most important ones were mentioned, and the remaining lectures are being devoted to a discussion of these, and of some of the established rules of management in each case. Owing to the total lack of apiary and equipment at the College no practical or research work can be attempted by the students this term. It is expected, however, that this handicap will be removed before another college year opens.

Before the lectures could proceed it was found necessary for the class to gain a working vocabulary, with definitions, of the more common terms, such as colony or stock, apiary, hive, swarm, queen, worker, drone, larva, etc., etc., also names of the parts of the hive and other things about the apiary.

To obtain any intelligent idea of the subject the underlying principles of bee-nature must be mastered. Bees are not domesticated in the same sense as the cow or horse. Through all the centuries that men have profited by their labors they have retained their wild nature quite unchanged. The insects that occupied the carcass of Samson's lion would have filled fancy, tall no-bee-way sections worth $2.50 per dozen if given the opportunity. Bees are simply wild insects kept in willing captivity by supplying them with the conditions under which they will thrive and produce honey. It is the purpose of these lectures to give the students some idea of what these conditions are and how to provide them.

In the time allotted to this work it is only possible to give the barest outline of facts with which every bee-keeper must be acquainted. The text-book which seems best suited to the purpose is "Langstroth on the Honey Bee, revised by Dadant." The students were advised to get copies of this work, and two copies of the latest edition were placed in the college library. Most of the students have their own copies now, and the lectures are based on selected paragraphs with marginal notes by the lecturer where his experience differs from that of the author. The subjects taken up are the general physiology of the bee, including external organs, and the respiratory, digestive and reproductive systems, the life history of the bee and something of the economy of the hive; honey and pollen gathering and the ventilation of the hive, the requisites of a complete hive, handling bees, swarming and its prevention; queen rearing, feeding, wintering and spring management, pasturage and overstocking; honey production and marketing and the diseases of bees.

Most of the students show a live interest and ask a great many questions when given the opportunity. Some have asked for practical work and expressed a desire to specialize in the subject.

As bee-keeping is one of the most profitable lines of agriculture, it is to be hoped that in a few years it will take its place at the Ontario Agricultural College alongside of poultry, horticulture and other important departments. We trust the bee-keepers of the Province will co-operate in every way possible in this work.

REVIEW OF APIARY INSPECTION FOR 1909.

Report of J. S. Schrank, Port Elgin.

I visited 97 apiaries, and I found that 18 of them had diseased colonies. The number of hives in apiaries visited, 1978; total hives examined, 754; total number of hives diseased, 105. All these I called on the second time and put through the cure and it was done in good shape. There is a lot of pickled brood nearly every place I visited. Wherever I found foul brood I went through every colony they had, and where I did not find it after looking at the hives most likely to have it, I did not bother with the rest.

The President: You noticed pickled brood amongst the black bees more than the Italians?

Mr. Schrank: These were all blacks. It seems when you get Italians and do not re-queen for a number of years they will turn black again. Pretty nearly everywhere I went I found it was pickled brood.

Report of David Chalmers, Poole.

The second week in April I wrote to all whom I knew had foul brood in their apiaries in 1908, requesting them that if they had any colonies die during the winter to either close them up securely or carry them to the cellar, and when on my rounds I found they had all complied with my request.

I would recommend that some means be used to compel those who own bees to keep them in movable comb hives, and this can only be done by a revision of the Foul Brood Act; second, that quarantining diseased colonies should be practised in some cases.

Visited 81 apiaries, aggregating 532 colonies. Inspected 272 colonies, detecting disease in 56.

Report of Jacob Alpaugh, Eden.

As apiary inspector for Grey and Wellington for the season of 1909 I started out early and found lots of dead hives containing foul brood and honey which needed to be attended to, as they would very likely have been robbed out by some other hives in the yard or some neighbour's bees. I found foul brood very prevalent in the northern part of Grey County, all the way from Wiarton to Thornbury. It is quite bad in a good many sections of both Grey and Wellington. I visited 132 apiaries—80 apparently free from the disease and 52 affected with foul brood. I have also found foul brood in some apiaries since I stopped inspecting.

REPORT OF W. A. CHRYSLER. CHATHAM.

I visited 74 apiaries with 1,192 colonies, and found 20 diseased apiaries. Essex County is, I think, free from foul brood, except in cases that failed to cure from last treatment. I found two new cases in Kent County and one in Lambton. Altogether the situation is improving.

In the season of inspection of 1908, after the honey flow was over, I found one section of country about a mile square that contained eleven bee-keepers, seven of whom I found had foul brood in their bees. One bee-keeper at the time of my visit had two diseased colonies being robbed by his own and neighbours' bees. As it was too late in the season to cure all successfully, I arranged to have all colonies treated or destroyed that fall that would not winter through.

This season ten out of eleven of the bee-keepers had the disease in their bees and were treated during the honey flow. It occasioned two and sometimes three visits to each. I feel confident that the County of Essex is fairly free from foul brood. I found foul brood in four new localities: one in Essex, two in Kent, and one in Lambton counties. The three last localities were located after the honey flow was over. On the last two days of my inspection I found a locality badly infected with foul brood in the neighbourhood of several large apiaries. As an instance how foul brood has spread in this locality: A farmer in selling his goods and chattels at auction, sold also his bees, which also contained foul brood. These were sold and distributed in more directions and localities than I have yet been able to discover. I would recommend that all auctioneers in every county be instructed not to sell bees before being inspected. I made seventy-four visits to bee-keepers owning 1,192 colonies of bees.

REPORT OF JOHN NEWTON, THAMESFORD.

As inspector for the Counties of Elgin and Middlesex for the past season, I beg to report as follows: After reviewing the work for the past season, it is gratifying to note that there has been some little progress at least over the previous year. During this season I was out 22 days between May 26th and August 13th. During this time I inspected 86 apiaries, containing 2,797 colonies of bees, examined 1,290 colonies in those yards, finding 63 colonies diseased. I instructed bee-keepers in the best methods of curing and cleaning up their apiaries. In 1908, I found disease in 28 apiaries. This season I found 11 of those diseased yards entirely free from disease. Several others were greatly improved, while some are about the same as a year ago through carelessness or experimenting. I feel I must lay stress on those buying and selling bees. No one should buy bees without first knowing that they have been inspected during the year by one of the inspectors. Again, bee-keepers should not allow bees to be moved into their locality without their being first inspected. I would recommend in some instances early and late inspection.

REPORT OF JAMES ARMSTRONG, CHEAPSIDE.

As inspector of Norfolk and Oxford Counties I beg leave to report as follows: During the season of 1909 I inspected forty apiaries. Out of the forty inspected six were diseased, this making only fifteen per cent. of the apiaries diseased. The total number of colonies inspected were six hundred and thirty-six. Out of this number forty-four were diseased, this making about seven per cent. of the colonies diseased. In the season of 1907 about fifty per cent. of the apiaries were diseased and about seventeen per cent. of the colonies, thus making a decrease of thirty-five per cent. in the number of diseased apiaries, and a decrease of ten per cent. of the number of diseased colonies. So that it can be easily seen that we are making good progress in stamping out the disease known as foul brood. Not only is the dreaded disease being stamped out, but good men are going into bee-keeping all over this district, and those that were in it are using more up-to-date methods.

A word or two about the time of inspection: A limited time is a great disadvantage as the inspectors should have authority during the whole year to stamp out the disease or the spreading of it. For example, I might say that while spending the holidays last Christmas in Welland County, I got a rig and drove over to a bee-keeper's, about six miles from where I was visiting, and who had asked for an inspector last fall, that could not go as it was out of the time limit. The day I visited this yard the bees were flying and the weather so warm that hives could be opened without injury to the bees. But opening hives was unnecessary, as the combs he had in store had lots of foul brood scales in them, so I had a chance to tell him what to do in the spring and thus prevent it from spreading. In opposition to my suggestion some might say that it would give the inspectors a chance to make money when the bee-keepers were deriving no benefit, but this can be easily overcome by putting in inspectors who are not working only for the money that is in it, but have the interests of the bee-keepers at heart.

REPORT OF MORLEY PETTIT, JORDAN HARBOUR.

My district for 1909 was the counties of Haldimand, Lincoln, Welland, Brant, Wentworth and Halton. The time was limited, the territory large and disease was dotted here and there over the whole six counties. Consequently no inspection work could be done where disease was not strongly suspected. Some disease was located only after it was too late to be properly treated. Incidentally some of the worst cases of foul brood were discovered in the most unexpected places. I would recommend that, if possible, two inspectors be placed on this territory next season or else one man who can give the work more time. A thorough inspection of every colony in the Province should be made as soon as possible. At present we are working largely in the dark. Of the apiaries inspected 25 per cent. were diseased. I have learned since the close of the season of other localities where disease is likely to be found.

I was sent to Trenton to investigate conditions in that region. Mr. Scott, the local inspector, will report the situation there.

REPORT OF H. G. SIBBALD.

In this season of 1909 I inspected 18 apiaries containing in all about 588 colonies. Out of this number 109 were found diseased, showing about 20 per cent. to be affected with foul brood. A few cases of pickled brood were found, but not as much as in the previous season. Bees were not in the best of condition generally, the clusters being small in the spring. The clover season coming later than usual no doubt would help these to get up in better condition for the season.

I regret that I was unable on account of pressure of my own work to do more inspecting. More should have been done in Simcoe County especially. It is a large county and has more or less foul brood throughout, and, in my opinion, would be cleaned up more quickly if a county inspector was appointed. I find some very old men who cannot see very well and who are forgetful and cannot carry out instructions well enough to make a cure. There are also busy farmers who need an inspector to stay or return to the work and see it all carried out carefully if they are to make a sure cure. The 24 days allowed each inspector is only a patch on the garment for such districts, yet we appreciate the efforts of the Department of Agriculture in doing more than ever before and getting in closer touch with the work from year to year. If I may be permitted to say a word or two about my own personal situation in regard to inspection work, I am far too busy with over 400 colonies of bees in their different localities to properly look after inspection work and will be glad if the Department can find some one who can devote much more time to it.

Report of J. L. Byer, Mount Joy.

I cannot give the proper attention to the work, for the simple reason that I have not time to do it. I am not very much enamored with the job, and if the Department can find someone else to take it I would be greatly pleased.

However, I visited 45 apiaries, and I found 20 of them diseased. I think I was away 19 days. While I have no suggestions to offer as to how to better the situation, I might say that the bee-keepers want to learn about the disease. I remember the first time I saw foul brood I travelled 40 miles for the purpose of seeing it. The very next year it broke out in our section. That visit saved us hundreds of dollars. The situation, while serious, is nothing really to be alarmed at.

Report of W. Scott, Wooler.

My report of inspection work for the past season is as follows: I started and worked in all directions from home. As soon as I got past the disease I stopped and went in another direction. I finally rounded up the diseased territory. I found European Foul Brood the only disease of any consequence. I found the disease confined to the townships of Murray and Brighton, and it covers about 100 square miles of territory. It has nearly wiped out a great many apiaries. One apiary of 76 colonies was reduced to 16 colonies and others in proportion. I found some apiaries completely destroyed. All the bees inspected were black bees, so I expect the disease will return in nearly all of the apiaries treated, as I do not believe European Foul Brood can be cleaned up unless the bees are Italianized, and from my experience during the past season I would strongly recommend the yellow or golden bees. The law should be amended, giving the inspector power to order bees transferred on movable combs in any apiary where he thinks disease might exist. Fully one-half of the apiaries I inspected during the past season are not on movable combs. Disease could exist and the inspector not find it. If the disease has been in an apiary a few months there is no trouble in finding it, even if the bees are not on movable combs. It is the cases just starting that will not be detected if the combs could not be handled. Then I think the law should forbid the moving of bees from one locality to another unless the bees are first inspected for foul brood. European foul brood is the worst type of foul brood known. It travels over the country so rapidly that the strongest effort possible should be put forth to stamp it out. I believe the most speedy and effective way to stamp it out would be to pay the bee-keeper or owners for diseased colonies and destroy them, or if they were determined to clean them up they should be made to Italianize them.

Report of M. B. Holmes, Athens.

I visited a goodly number of apiaries widely scattered over a large area and of the yards so visited about fourteen per cent. had foul brood. In cases where from observation I was forced to conclude that the directions as to treatment would not be followed in detail, the destruction of the affected colonies by fire was advised as a short, swift and sure treatment and cure, and our orders were cheerfully obeyed. In other cases, where a course of treatment was prescribed, I believe everything is all right. Bee-keepers are thoroughly seized with the importance of this work of inspection, and show a ready willingness to render all necessary assistance. There are, however, small yards of bees in every county whose owners pay little or no attention, not knowing or caring what is inside their hives, nor ever feeling the need of an inspector.

Report of A. A. Ferrier, Renfrew.

As inspector for the counties of Renfrew, Lanark and Carleton I was able to spend only thirteen days on inspection work and travelling. I inspected thirty apiaries containing seven hundred and six colonies, of which sixty-two were diseased, sixty-one of which were black brood and one American. Most of the European was found in the one town and among parties having only a few colonies. I had time to inspect only one of these yards the second time. In it, where twenty-two colonies were diseased early in June, two months later only one colony showed a few cells of the disease. In nearly every case where I found trouble it was with men who take little interest in their bees, never heard of foul brood and seldom or never see a bee journal.

Report of J. Leslie McNaughton, St. Raphael West.

As apiary inspector for the counties of Glengarry, Prescott and Russell I have inspected during the season of 1909 one hundred and three apiaries. The total number of colonies was 4,057. Out of the above number of apiaries there was only one in which I found foul brood. In more than half of the apiaries I found dead brood, and have been called upon time and again to examine colonies in which none but starved brood existed.

A great many bee men are still ignorant as to the bee diseases and their results, but as a general rule they are willing to learn, see the inspection go on and do all in their power to keep down the disease. A few, but very few, are satisfied that they know all about bees. This last class I found the hardest to deal with.

Report of Homer Burke, Tayside.

I put in about fourteen days inspecting and examined some fifteen hundred colonies, most of the yards being small, and I am glad to say that I could only find foul brood in two yards and those were very bad. However, it being in the early part of the season we got them cleaned up and both men secured a fair crop of honey. I am quite satisfied there is not the amount of foul brood in the east as in the west, although it seems to be spotted in different places throughout the east, and I believe now is the time we should do all we can towards stamping the disease out of the Province. I have come across many men who keep from five to twenty-five colonies and have never heard of foul brood, and they are the kind of men that are hard to deal with when you do find the disease in their yard.

MY EXPERIENCE WITH EUROPEAN FOUL OR BLACK BROOD.

By W. Scott, Wooler.

In the spring of 1907 I was feeding all of my 112 colonies for the purpose of stimulating brood rearing. I first fed some buckwheat honey I had on hand, then I fed one barrel of Jamaica crystal sugar, then fed granulated sugar. After feeding the Jamaica sugar for some time I noticed the brood dying, but thought it was due to the cold, backward weather, but at the approach of warm weather the trouble continued and the larvæ had the appearance of foul brood. I notified the Department of Agriculture at Toronto that something was going wrong with my bees. In due time Mr. J. L. Byer called and examined my apiary and pronounced the disease to be European foul brood. He thought it better to send a sample to Washington, D.C., and have a test made of it to see if it was European foul brood, so I deferred treatment until I heard from him. In due time I received a letter from Mr. Byer stating that they pronounced the sample sent to Washington to be the real New York bee disease, or European foul brood. He also stated that I could treat the bees as I deemed best. As the season was very poor for honey I decided to use the Alexander treatment. So I killed all queens and united the colonies down to fifty. As many of the colonies were very weak in bees by the middle of June I kept the queen cells cut out and kept the bees queenless for 27 days, then gave each colony a young Italian queen, raised in another apiary. The treatment worked very well until the brood began to hatch, then the disease broke out in nearly all the colonies again. The Italians used were the three banded or leather-coloured stock. I put the fifty colonies in winter quarters and came out in the spring of 1908 with 45 colonies. The disease broke out again, so I decided to use the McEvoy treatment this time. I shook them and united them down to 23 colonies. I did not treat the hives or frames in any way, but cut out the combs and used same hives and frames. The disease broke out in one colony only. In about six weeks or two months I treated this colony as before and made a thorough examination for disease in all colonies, but found none in the remaining colonies. I placed the 23 colonies in winter quarters and wintered them successfully. I placed them on summer stands, April 6th, 1909. In fruit blossom time I examined all colonies and found them entirely free of disease. Towards the last of June I found disease in one colony. I at once examined all colonies for disease and found disease in eight colonies. The colonies were crossed between the blacks and Italians, and were the only colonies that contained disease of any importance. The rest of my bees were golden and leather colored Italians—about pure stock. I did not see any trace of the disease in the Golden stock, but saw a few cells in some of the leather-coloured stock. I found by close watch of the diseased colonies that the bees removed the diseased larvæ soon after it died, and the disease disappeared altogether in these colonies. I treated part of the eight colonies, and to the balance I introduced Golden Queens to test the matter as to the Goldens being entirely immune to European foul brood. It will require another season's watching to determine this. I procured a valuable breeding queen, the best I could buy. Her stock were dark Italians. Shortly after they built up into a full colony the disease broke out in them and the bees allowed it to run its course. I only bred a few queens from her, as I prefer the Goldens at present. After rounding up the diseased territory, as I have in my inspection work during the past season, I believe that the disease started in my apiary and spread in all directions from it. In one direction it has travelled fully ten miles in two seasons. I have no positive proof as to how the disease was carried to my apiary, but always have suspected the Jamaica sugar as containing the germs of European foul brood.

Mr. Holtermann: I think Mr. House or some of the New York State delegation told me this morning that there were 38 States in which that disease had spread with great rapidity. I have been anxious from the very moment I heard that that disease was in this Province; and at that time I made a suggestion that those apiaries should be purchased immediately and destroyed, and the best arrangement made with the Department for compensation that could be made. We are in a peculiar position in connection with foul brood. Practically all the other diseases of animals are under the control of the Dominion Government, and there is reimbursement when animals are destroyed. It is difficult to follow on what ground the Province controls the one and the Dominion the other. When the Dominion Department of Agriculture stands all the expense in connection with hog cholera and mad dogs and so on, why could not there be an effort made to get the Dominion Government to co-operate in paying the expenses in connection with the suppression of European foul brood. I see no reason why that disease will not sweep over this entire Province as well as over the entire Dominion, if that is not done.

Mr. House: When the disease first appeared at my home apiary we sent samples to Cornell, and Dr. White, at that time, pronounced it pickled brood; and wherever we found European foul brood since, we first found pickled brood in advance of it.

Mr. Sibbald: How many years after?

Mr. House: Five years ago it first appeared there.

A Member: Is it not against the law to keep bees in box hives?

The President: Not exactly.

Mr. Armstrong: I think the inspector has power to deal with such cases. I will read the section (section 4):

> "The Inspector shall have full power, in his discretion, to order any owner or possessor of bees dwelling in box-hives, in apiaries where the disease exists (being mere boxes without frames), to transfer such bees to movable frame hives within a specified time; and in default of such transfer, the Inspector may destroy, or order the destruction of, such box hives and the bees dwelling therein. 53 V., c. 66, s. 4."

If I found a case of that kind I certainly would destroy it after I gave the bee-keeper a certain length of time to transfer it.

Mr. Timbers: I think it should be worded so that they have to transfer them in any case.

Mr. Byer: Where he suspects the disease, would cover it.

Mr. Chrysler: How can they transfer those combs and honey and everything? If a colony had the disease it certainly would be spread more by this transferring. I do not believe in transferring these old colonies, it is more dangerous than to leave them there. You can inspect bees in box-hives.

Mr. McEvoy: Certainly.

Mr. Holtermann: I do not see that an inspector has any authority to order the transfer of an apiary which is all box-hives until he has found the disease in it. That certainly should not be. At the same time, we need not talk about legislation to control people to have all their bees in movable frame hives, because you might as well have a law that a man shall keep his chicken in a certain way. It seems to me it should be so corrected that where the disease is found in the neighbourhood, or where the inspector has any reason to suspect, that there he may order the transfer.

Mr. Chrysler: Is there any inspector who could himself transfer the bees safely? It cannot be done safely without robbing and spreading the disease.

Mr. Timbers: I think I could transfer them without breaking up the combs or anything.

Mr. Herschiser: Mr. House, I believe, says his bees have all been touched with European foul brood. It appears the more he has of it the more honey he gets, and I would like to hear from Mr. House.

S. D. House, Camillus, N. Y.: In stating how I get so much honey with European foul brood, perhaps I would have to go into quite a talk. First, it is partly system. When the disease first appeared in my apiary I did not know what it was, and I called the inspector's attention, and they sent samples to Cornell, and it was pronounced pickled brood. I had eight colonies affected out of 160 some odd. The next spring those same eight colonies had European foul brood, and the same season we had 100 and some colonies that showed European foul brood. I tried 40 colonies upon the Alexander system. My bees are a cross between the Italian and Carniolan, and I failed generally in the Alexander system with this strain of bees. Then I followed the inspector's instructions of shaking, a single shake, upon a new hive with new foundation, and I found where I had the dark races of bees I might shake them one, two or three times, but I still had the disease, but in the meantime I had procured some honey by tiering up two or three colonies to make one very strong, and stacking up the combs on another diseased colony in which the brood was hatched out, and giving this new colony a strong family of bees; but it contracted the disease again later in the season after the honey flow was over. It was discovered the Italian bees were able to contend with this disease. The Italian would carry out the larvæ before it came to that watery stage that it could not be handled. I have seen the disease when it was in the hive with an Italian colony of bees and not 100 sealed cells, and you could not find 100 capped cells of larvæ in the hive, the queen laying every day her full capacity of anywhere from two to four thousand eggs, and as soon as they were hatched, out they went. That operation was continued until it was cleaned up.

I am curing up European foul brood, returning my old comb from a diseased colony back to a colony again, and putting bees on them and going ahead.

Mr. Herschiser: You do not destroy the comb then?

Mr. House: No. I did at first.

Mr. Byer: Do you not find your bees are more immune after it has been in the locality a while?

Mr. House: Certainly they are, because they are getting in Italian blood. You cannot cure European foul brood with black bees; I do not care how many times you shake.

Mr. Herschiser: I want to know if the combs that are above a queen excluder in a colony that has this European foul brood and become diseased, can be used again?

Mr. House: They certainly can.

Mr. Herschiser: Supposing they are black bees, is there any disease in those combs?

Mr. House: That would depend upon whether there is any honey there or not. The scale is not there in that comb. The germs lie in the scale, and if the bees can polish up the comb, they will do so. I have cured it by feeding.

Mr. Herschiser: You would not destroy a comb that had not been used for brood?

Mr. House: I am not destroying those that have been diseased; I have caused the bees to clean them up.

Mr. Herschiser: I think there is a good deal in a bee-keeper who understands his business real well. That would be dangerous for a novice to do. I can see why it would be dangerous to advocate the use of these combs. I would be inclined to destroy all combs and start with a new yard.

Mr. House: A year ago I replaced 40 supers of brood combs that had been diseased, and stacked one pile above the other, and allowed them to run as extractors with zinc below. The honey and brood combs were placed back in 40 different colonies in the fall to winter. Out of that 40 colonies I had three colonies where the disease appeared. Eventually they cleaned that up, and those hives are perfectly free from it to-day, and have kept so, some of them, for three years now.

Mr. Herschiser: All you do is just put in Italian blood?

Mr. House: Yes.

Mr. Byer: Have you a special preference for Golden Italians?

Mr. House: I have what I call the four banded. I do not believe you can give the disease to an Italian colony of bees unless by direct introduction. A colony left entirely alone with the diseased comb has cleaned it up.

Mr. Dickenson: You would not recommend using the old combs?

Mr. House: Not with American foul brood. That is the difference between the European and American foul brood. The European is much more rapid in its travelling, but it is much easier to cure.

Mr. Johnson: Have you any theory as to how it spreads?

Mr. House: No, I have not. I think possibly it could be brought in by robbing. I have not a comb used for extracting, but what has been diseased, and they are to-day in use, and I have not had but three colonies that it appeared in this season, and they have cleaned it up.

The President: All of us who have seen what we call dead brood or anything of this kind find it has been among black bees.

Mr. House: We have apiaries that have been thoroughly Italianized before the disease appeared, and there has never been a particle of the disease found there, and it is all around.

Mr. Byer: What about Carniolans?

Mr. House: They are not as good; they are not as immune.

Mr. Herschiser: Given an apiary of black bees that are predisposed to the disease, I have heard it said you cannot cure them of European foul brood on the same ground. How is that?

Mr. House: I do not know where they get the disease.

Mr. Herschiser: Suppose you treat every colony in the apiary, will they carry it in off the same ground? Is there enough of it around there?

Mr. House: I think so.

Mr. Timbers: I would like to ask Mr. House what an Italian bee is? Does that mean from an imported stock from Italy, or a queen bred in America whose ancestors have not been in Italy for perhaps twenty years?

Mr. House: The race of Italians has been in America for perhaps twenty years, but the original stock was imported. The Italian bee is a better housekeeping bee. The propensity for cleanliness of the Italian bee is so far superior to the black bee that it will not allow any dead brood to lie in the cells.

Mr. Timbers: They tell us the Cyprian queens are yellower by far than the Italians. Is it the golden blood of the Cyprian that is cleaning this out, or is it the Italian blood?

Mr. Herschiser: It is the good housekeeping blood.

Mr. Timbers: I believe there is more in that than in the colour of the bee.

Mr. Herschiser: How about hybrids; they are always good honey-gathering bees?

Mr. House: They are, but I have had hybrids that would clean up.

A Member: If you had a colony affected by foul brood to-day and you should Italianize them, and they should clean up the hives, would it be safe next year to put black bees on again?

Mr. House: No, you would be just as sure to have black brood there. Black bees get it anyway; they are bound to have it.

Mr. Herschiser: If I should get 100 of your clean combs and put black bees on them, would my bees get foul brood?

Mr. House: Yes.

Mr. Herschiser: Your combs are diseased then.

Mr. House: They certainly are. I want to emphasize one point in regard to Italian queens. I believe that where there is a colony of bees that has been thoroughly diseased, that the queen is also diseased, and I would advocate that the queen be killed. I notice here that in using the Alexander system you have been introducing laying queens instead of capped cells or virgin queens; it is all wrong. We want to get those bees in such an excited condition and so crazy for brood and to carry on their existence, that they go to work and polish up the combs, before the queen gets to that laying point, during her mating. You cannot cure European foul brood under the Alexander system with black bees. I do not care if you carry it out a thousand times.

Mr. Ross: Didn't Mr. Alexander recommend the introduction of virgin queens?

Mr. House: I believe he did, and that they must be Italian queens, but I believe that point has been overlooked. Until you can get a new generation of Italian bees there you are going to find black brood.

QUEEN REARING AND HONEY PRODUCTION.

By F. P. Adams, Brantford.

It is the writer's wish in the present paper to bring before beekeepers the importance of the practice of artificial queen rearing in connection with the production of honey. In order to have strong, populous colonies it is essential that the queens be vigorous, but many of the manipulations now practised, while they accomplish the objects sought, yet they have a very certain and harmful effect upon the queen stock raised under the artificial conditions imposed.

New and better methods of handling bees are constantly being developed and the hand of man is now employed in regulating their natural instincts, but when we undertake to pit our understanding against the forces of nature we must make sure that our interference will not result disastrously in ways that we least expect.

Artificial swarm control, artificial divisions for increase and artificial stimulating are now successfully practised, but the subject of artificial queen rearing, which should go hand-in-hand with these, is handled rather gingerly or left in the hands of specialists, and yet a knowledge of this subject is the basis of success with the others. If we prevent our bees from swarming, where are the young, vigorous queens to come from to head next year's colonies? Of what use are artificial divisions if we cannot supply them with properly raised cells, or of what advantage is stimulative feeding if we do not have queens in the hives with vitality enough to respond to the stimulating?

It is very interesting and instructive to trace the development of the methods now largely employed by bee-keepers to obtain increased yields of honey and at the same time to keep under control the natural swarming impulse. It may also be instructive to note how these manipulations affect the welfare of the colony in the generations to come.

Probably the simplest manipulation is hiving the swarm on the old stand, thus throwing all the field bees in with the new swarm to give an added impetus to honey gathering. This manipulation certainly accomplishes the object sought. It concentrates a tremendous force of field bees for gathering in the crop, and as there is no brood to look after for a few days the honey piles up very rapidly in the supers. But what about the partially developed queen cells in the old colony that has been drawn on so heavily for bees? Does it seem reasonable that they will receive the warmth and attention so necessary to their growth into good, vigorous stock?

Another manipulation generally practised is the control of troublesome after-swarms by breaking down the cells left in the hive after the departure of the prime swarm, leaving only one cell to hatch out. This also accomplishes the object sought. No after-swarm will issue if there is only one queen cell present in the hive, but the same objection applies here as in the former case. The few bees in the large chamber will not give any more attention to one cell than they would to six. If the nights are cool, they will cluster in the centre of the hive, perhaps away from the queen cell, leaving it unprotected, and the young queen will thus be injured.

Next in order is the practice of universal shaking. By this method colonies are examined every few days and any found making the first preparations for swarming are shaken on to new combs on the old stand and the brood disposed of in various ways. From the standpoint of improvement in the stock this method is the most rational of any since there is no endeavor made to raise queens under unfavorable conditions, and the bee-keeper is forced to work out some other method of propagating his stock. We must all face this problem sooner or later, and although there are many difficulties awaiting the bee-keeper who proposes to raise his queens artificially, yet after he has mastered the subject I believe that he will consider the time well and profitably spent. The system of shook swarming lends itself admirably to production of the finest queens, and it is the writer's wish to sketch briefly such a method, one that can be readily adopted by any careful bee-keeper.

Wait until colonies are being shaken and there is plenty of brood in upper storeys.

There is nothing in the system which we use but what any bee-keeper can adopt. It is a well known system; it has been developed from several different queen breeders. We use the Doolittle plan for grafting cells, and the other apparatus is simply development along lines which will help in the making up of increase and making of nuclei. I think the first requisite in any operation for making up artificial queens is in getting the colonies in proper shape to raise them. A great mistake made is the starting to raise cells before the colonies are in condition, and starting to make increase before the brood is in condition for making up that increase. I believe it would pay any man to wait until his colonies are in shape before he starts any manipulation with the object of raising queens. We usually wait until the colonies are strong, and until possibly there are a few starting to prepare sealed cups. These colonies are shaken off on to new combs. The brood from these colonies is distributed around the yard to other stocks—possibly two or three combs given to one, and two or three to another, and it is not always given to the weak stocks either. It is given to the medium stocks usually, and these medium stocks are built up until they have brood above, until it is necessary to put on queen excluders; and when they are in this condition I believe the yard is in good condition to start queen rearing.

The first step, of course, after the brood is in shape, is getting the cells started. The cells are grafted by the Doolittle system into prepared cell-cups. They are grafted from the best breeder in the yard, and I do not think it is necessary to go into details of this, as it has been described so often. Before the grafting is done the swarm box is used. A swarm box is simply a box made like a hive to hold three combs, and it has a cover with a slot in it to hold this stick of prepared queen cells. The bees are simply taken and shaken into this box—that is, enough bees to fill the box nicely. A frame of honey and a frame of brood is put in, one on each side. The box is left in that condition for five or six hours until the bees realize their queenlessness and are ready to accept cells. Then this grafting is done, and the grafted stock of cells is put into the box. Usually the shaking is done in the morning, the grafting is done in the afternoon, and the cells are left with the bees until the next morning. By that time, those that have been accepted have been fed quite a bit of jelly, and they are then taken and put into the colony that the queen has been taken from, and the frame of prepared cells is put above the queen excluder with the queen below. The frame that holds the queen cells is simply an ordinary frame fixed up so that it will fit in. It is put in the centre of the upper storey of the cell-building colony. They go ahead and complete those cells, and when they are ripe in about ten days' time the cells are put into nuclei. Now, by having so much brood above queen excluders in the yard, the yard is in good shape to make up the nuclei, because the brood is capped over, and there would be none lost by neglect or chilling; and by taking one or two frames of this brood that has been entirely capped over in rearing above, and giving it to the nuclei, we have the nuclei started. Any shaking after that can be done; and an occasional frame of this brood is put above the queen excluder and given to the nuclei and the young colony is built up in that way.

I think it is a very nice way to introduce queens, by giving ripe cells, much simpler than introducing laying queens.

Mr. Newton: I believe, just as Mr. Adams says, that the time has come when bee-keepers will have to do something, because our mode of working as it is to-day is very different from what it used to be a few years ago.

The first thing that struck me in Mr. Adams' paper was that in order to have good strong, prosperous hives we need good queens, queens that are always on the alert, that are ready for business; and if we do not have them we are sure that we will not have the good big stocks of bees, and we will not secure the crop of honey which we set out in the spring to do.

At our Convention in London just a week or so ago, one gentleman was talking about some hives of bees that he had that would neither give him honey, increase, nor anything else. Well, I said that there was sickness there, and that those were the hives that ought to be doctored. I think a man that has a bee-yard and has hives in that shape ought to be the doctor and should go right after those hives; and the first thing he should do is to find out what kind of queens are in those hives, and if they are not good queens he should replace them with such queens as Mr. Adams has mentioned in his address—vigorous queens. And I also believe that good, vigorous queens cannot be produced under the circumstances which Mr. Adams has spoken of, that is, shaken-swarms. I thought that the idea of raising the cells from those stocks that had lots of bees and were in good shape to produce cells, as Mr. Adams has said, was the right one.

We have several queen breeders now in Canada that we had not a few years ago, so I think it ought to bring up a good discussion. We have some with us this afternoon.

MR. CHRYSLER: Wherever Mr. Adams puts them, does he introduce the cell instead of the queen?

MR. ADAMS: Wherever it is possible to introduce cells, we always make a practice of using them that way. It is much easier to introduce that way than introducing virgin queens.

MR. DICKSON: Does Mr. Adams think that the artificial queen is healthier?

MR. ADAMS: The great trouble I find with many bee-keepers who have tried this plan is that they start raising queens too early in the season before the bees are in shape, and my experience is that with my plan you get great deal better queens once you get started.

MR. DICKSON: I have followed that system for four or five years, and I have received excellent queens.

MR. NEWTON: I have introduced during the past season about thirty queens, and thus far I have found them very vigorous, and have been well satisfied with the change that I have made. Do I understand Mr. Adams to say that good queens could not be raised from the old colony where the swarm has issued from?

MR. ADAMS: It depends on how that old colony has been treated.

MR. WALTON: I have used that system quite a few years, of grafting cells. I did not use it on a stick. I used it on half drawn combs. I do not know whether that would make any difference.

MR. ADAMS: I do not think so. It is just a matter of convenience. I like the idea of having the queens all of the same age and knowing just when to start manipulations.

MR. HERSCHISER: As I understand it, Mr. Adams claims that the queens will not be as vigorous, because if the colony from which the swarm issues is moved to another stand, the queen cells will suffer and therefore will not be as vigorous. Now, I think it is the rule that the colony swarms when the queen cell is capped or just about to be capped, or fully fed up. I would like to know if it is the opinion that any neglect that the cells might suffer would have any effect on the vitality of the queen?

MR. ADAMS: Yes, sir, I believe it would have a very big effect on the vitality of the queen. Of course we all know the swarms issue at different stages. Sometimes the cells are just capped over. Well, from that time I think it is just as necessary that that young developing larva should be properly protected as it is that an egg should be properly protected. If it gets a chill any time during this development it is sure to show in the queen.

A MEMBER: It would not hatch if it got a chill, would it?

MR. ADAMS: It will not be the same queen.

MR HERSCHISER: It will depend upon the weather.

MR. BYER: The men who breed queens have been responsible for a lot of poor queens.

MR. HERSCHISER: As a rule queen cells are sealed over when swarming begins. I do not find that always to be the case. Very often one or two cells are sealed over. I have had them swarm under those conditions. I believe that this slipshod method is responsible for a lot of poor queens.

MR. BYER: On the point of commercial queen rearing, I do not know what others have found, but I have found, regardless of the fact that the business is increasing by leaps and bounds, that with the majority of queen breeders it is not a question of how many queens they can sell, but how many queens they can produce. They find ready sale for the queens at the present time. I sometimes wonder if, in the hurry of the season, some of the little points are not neglected. I have bought a lot of queens from a breeder, and had almost universal satisfaction. Then again I purchased two dozen, and a dozen of them were not worth the mail charges. We got them from a queen breeder of international reputation.

D. ANGUISH: I was just going to ask the question how it was there were so many of the queens turned out to be no good from these men that make a specialty of queen rearing. Of course I do not buy a great many queens, but I get a few every year, and there is such a difference in them from the same men. Whether it is my fault, or whether the fault of the men that send out the queens, I do not know. I say a man should raise his own queens as much as he can. I do not think a man raising queens gives his bees the same chance as a bee-keeper does. I have got a couple of hundred colonies, and those I raise my queens from next year are the best colonies I have had this year. I think a man should try to raise all he can from his own colonies, not saying that the specialist is not doing the best he can. A great many of them are in the queen rearing business and not in the honey business.

MR. MCEVOY: How many queens do you raise on that stick of sixteen cells?

MR. ADAMS: From twelve to fifteen.

MR. WALTON: I presume Mr. Adams is one of the most practical and the largest queen breeder we have in the Province. I think it is quite time that we put a little of our genius into queen rearing, for I believe that is very important. I would like to ask Mr. Adams under what temperature he introduces larvæ?

MR. ADAMS: During the summer, while the weather is warm, just the natural temperature of the summer weather, before it gets cool in the evening. Of course in starting cells very early it is necessary to use artificial heat. In the last few years we have found it is necessary not to start very early. It is better to wait till the weather is warm and settled before starting operations. We start about the 1st of June.

MR. WALTON: Is the 1st of June the earliest?

MR. ADAMS: Well, the 1st of June was our earliest this year. This is one of the fine arts of bee-keeping, to rear good queens; and it is a fine art that we ought to pay more attention to if we want to get good queens. We talk about black brood and foul brood and all these things, but I tell you that if we had first-class queens and good stocks of bees we would not have so much foul brood. And in reference to having the larvæ well fed, I would like to say, what better is a queen that has a third more royal jelly after she has matured than one that has had enough?

MR. ADAMS: I think it is better.

MR HERSCHISER: If I was going to take a trip to the North Pole. I would want to take a little more perhaps than would last me. (Laughter.)

A MEMBER: I would like to ask Mr. Adams if he uses the queen nursery?

MR. HERSCHISER: I have heard indirectly that some of the largest queen breeders we have are using an incubator for the nursing of the cells after they have been capped over. I do not know whether that is a very good scheme or not. I am not a queen breeder, and I do not know anything about it.

MR ADAMS: Of course by a queen nursery I mean a frame of small queen cages, that is, cages that are inserted in the brood nest of the hive.

MR. WALTON: It appears to me that we all have ideas which, if carried out, would possibly be injurious to queen rearing. For this reason, as far as my experience goes in queen rearing, we must conform to the original working of the bee in propagating the cells, and if you follow their ways as much as possible I think you will get better queens. Unless we have a certain temperature we cannot follow in the line of the bee, and, as Mr. Herschiser has just said about the incubators, they are a success when everything is properly carried out, but otherwise they are a failure. Just the same with queen rearing, how could ordinary beekeepers get a certain temperature without a great deal of practice and skill and possibly expense? How can we get an incubator to incubate those cells?

MR. ADAMS: I never heard of an incubator being used before.

MR. HERSCHISER: The largest queen breeders in the United States are using incubators.

MR. SCHRANK: I ran across quite a few of the queens that Mr. Adams shipped out last year. Whatever method he has, it seems his queens turn out pretty good.

MR. ROSS, Montreal: Do you not think that in breeding our stock we are losing sight of a great fact, and that is that we have no possible power of selection? We are breeding our stock, and if we breed in an artificial way under conditions that are purely natural from selected stock, we are standing a great deal better chance of improving our stock.

MR. HERSCHISER: That is a good suggestion, but there is no way of getting around it. If you want to rear queens by the natural process, and you take and put on black bees that have swarmed and go through and take out the combs and extract the the larvæ from the cells—and you can easily take the larvæ from your best queens—you will have selected stock then, and you will have all the advantage of rearing queens in the natural way.

MR. TIMBERS: Why not take the comb from your selected colonies and give it to the other colony? I have been practising that for three years now, and it is far ahead. I saw somewhat the same plan explained a while ago by a gentleman from the other side in the Canadian Bee Journal.

MR. MILLER: I do not think there is any fear of handling larvæ. It is a great advantage over transferring combs or making queenless colonies, or anything of that nature. You may rear good queens if you give it the time, which is much less than is required for handling your combs. The grafting system I find the most successful. I think you will find if you will take time, it is almost all that any bee-keeper will need, and you will have great pleasure and success in doing it.

MR. PETTIT: I think it simply amounts to this, that queen breeding is a business by itself; that we are keeping bees under artificial methods, and artificial methods must be adopted in all lines. Now, if a honey producer is going to breed his own queens, that must be a line to work out by itself, not allowing the bees to swarm, and running chances on getting your good queens from any stock that happens to swarm, but making a special branch of the business of breeding queens. I think honey producers find it more profitable to buy their queens. If a man is running a series of different apiaries, and he is busy with honey production and most of his time is taken up with that, he cannot do very much queen breeding. It is not profitable to allow the bees to raise their own queens and do their own re-queening. It just comes down to this, we must recognize each line of our business is a business by itself; extracted honey production, comb honey production, queen breeding, and all these different lines must be worked out in an artificial way by themselves.

MR. TIMBERS: Do I understand Mr. Pettit to say that a honey producer cannot raise his own queens, and that he must buy them? My experience has been, I have bought queens from every State in the American Union, and I have never got a queen yet that I could not find a better one in my own yard. That comes pretty hard, perhaps, on our friends on the other side. I mean that a man who cares to take the time that is necessary can raise better queens than he can import or get through the mails.

MR. PETTIT: How many yards have you, Mr. Timbers?

MR. TIMBERS: I have two.

MR. PETTIT: It just depends on the circumstances. If the man is able to be home every night he can probably rear his own queens. But supposing he has to leave home on Monday morning and not back till Friday, he has little time on Saturday to look after his bees. He only sees his bees once a week. There are commercial travellers, and men in other lines of business, who are keeping a few bees as a side line.

MR. LOWEY: I rear my own queens. The last I got were the finest I ever had. I have bought queens from queen breeders, but some of my own queens will outstrip them all. I look after the swarms, but I don't find any less bees in the hive after they swarm. I have opened, I might say, dozens of cells, and I noticed royal jelly left they had hatched.

HONEY PRODUCTION IN THE EAST.

BY H. E. EYRE, CHANTRY.

I was invited here to talk to you about honey production in the east. I think there has been a steady improvement during the past few years, and bee-keepers have been doing better. In 1907 the Bee-keepers' Association provided us with an inspector. The bees had not been doing well. Some of the bee-keepers were afraid there was something wrong, but thought the bees would get better themselves without an inspector. Men who had not been very successful, when the right man comes to them and approaches them in a proper manner, are usually glad to learn, and we want them to learn, and we want to have more bees than we have. In the township where I live we have got ten good cheese factories, and at least 200,000 cows, and I am not sure but what our town is as well situated for bees as it is for cows. Some twenty years ago Prof. Robertson began a revolution in dairying, and it helped out wonderfully in our county. The keeping of bees is not going to work to the detriment of the keeping of cows. In fact, I don't know but that it would help. I don't agree with many men who think they cannot make it a side issue. They are renting a house, perhaps an acre of land; there is some place there they can set a colony or two of bees. They can supply themselves with honey. They have some cash, and, instead of being hard up, have some of the table luxuries; they have the very best, the very purest, and the most healthful, at a small cost. If there is any line in which this Ontario Bee-keepers' Association can be of benefit it is in encouraging people to start keeping bees. I do not mean to start a great big bee yard. We cannot all expect to be a Holtermann, and we can't all expect to be a Couse, and I don't know that we can all expect to be a House; but I am sure we expect to be something, and to do something for our fellows.

EXECUTIVE REPORT, 1909.

The membership of the Association for the year is 276. Of this number 174 came in from the affiliated associations, the balance in single subscriptions. There has not been much change in the membership from year to year, and it is just a question whether a special effort should not be made to increase it through the organization of local associations in other parts of the Province, and also through soliciting single subscriptions from bee-keepers where there are not enough to organize associations. The section of the Horticultural Exhibition devoted to honey, shows in the entries that there is very little competition from other than two or three of the large exhibitors. This is disappointing, and something should be done to effect a change.

Last year there were entries received from quite a number of smaller bee-keepers, but this year there are practically none except three large men who make a business of attending these exhibitions. The prize list was revised this year, so as to reduce the number of sections, but increase the prizes with the hope that other parties would be induced to show. This, however, has not had the desired effect, and there is no doubt that the exhibition does not serve the purpose that it ought to. The sections cut off were those calling for new inventions, packages, etc., and which were found to be of no value.

The Foul Brood inspection was again carried on during the year through the Department. The districts were reorganized and fourteen inspectors in all appointed for the Province. The grant was raised to $2,500. The full amount has been spent, and it is to be hoped that the reports of the inspectors will show that some gain has been made in checking this disease. The inspection in the east has shown that Black or European Foul Brood has spread much farther than a year ago. The address by the inspector for one of the eastern districts will, it is hoped, bring out a full discussion on the best methods of treatment for this disease.

The Department again prepared a report on the condition of the industry which has been sent to all parties interested.

REPORT OF REPRESENTATIVES TO EXHIBITIONS.

By J. D. Evans, Islington.

At a meeting of the Committee of the Toronto Industrial Exhibition Association, who had charge of that matter, there was a discussion on the part of that committee to remove the exhibits of the bee-keepers into the old building near the western entrance, in connection with the dining-hall. The provinces were going to make exhibits and the room would be required, and part of the room would also be required for the flowers and vegetables. I thought the bee-keepers had been chased around from one place to another. I, of course, alone represented the honey men, and we had several bad fights about that, but finally it was suggested that the honey exhibit be moved to the dairy building. That didn't strike me as being a very good place. However, at the last meeting of the Committee Mr. Grainger and the President (Mr. Couse) and Mr. Laing, were satisfied to have the exhibit in the dairy building. The exhibit I believe was a very good one, but you will notice that the second and third prizes on our Association's "best display" were cut off, only one prize being given. I agreed to give $25 on condition that the exhibits were satisfactory to the honey men, otherwise I told them we wouldn't pay it. I think the exhibit was one of the best we have had.

I think whoever represents you in the future should appear before the Executive and insist on the second and third prizes being continued as heretofore. I think it would be advisable for the exhibitors, as much as possible, to keep on good terms with the Association and not put them to any unnecessary trouble. Friction should be avoided as much as possible, and I think there are details that ought to be decided by this Association at this Convention. I think this Association should settle the question as to whether men should exhibit honey that is not the product of their own apiaries.

A discussion here took place participated in by Messrs. Timbers, Hershiser, Grainger, Holtermann and Evans, on the question of whether exhibitors of honey should be confined to exhibiting their own production, or whether they should be at liberty to make exhibitions of honey produced by others as well. The feeling of the meeting was strongly in favour of confining the exhibition to the bee-keeper's own product, and the following resolution was adopted: "That this Association is strongly in favor of and advises exhibitors of honey at exhibitions to make an exhibit of their own production only."

Report of W. J. Brown.

I beg leave to report as follows: As your representative to the Central Canada Exhibition, I would say that a most creditable exhibit of honey was made by four or five bee-keepers. The officers of the Central Canada Association have on all occasions treated the honey producers with great consideration in every way, particularly in their liberality in granting good prizes to those of us who patronize their exhibition.

DIRECTORS' REPORTS.

Division No. 1: Alex. Dickson, Lancaster.

The honey industry of eastern Ontario is not up to the standard of former years. There have been a few years of failure which have discouraged quite a number of beginners, but this last year more are going into the business, especially in Glengarry, owing to the crops of 1908 being exceptionally good.

In the district that is allotted to me as one of the directors, I find that the crop has been rather varied. On the east boundary of Glengarry it went up as high as 125 lbs. per colony, other parts only 25 lbs. per colony. In the county of Prescott the average was 50 lbs. per colony; Russell something the same. Stormont and Dundas also show a very good average.

Throughout the whole of this district there was a good flow of buckwheat honey. One remarkable report received from the north end of Dundas was a yield of 142 lbs. per colony of fall honey, all from the touch-me-not plant, which sprang up in a swamp that fire had gone over last fall. Strange to say this same yard had in the beginning of the season great difficulty with foul brood, but the colonies were put in good shape under the instructions of Mr. Burke. I find that quite a number of bee-keepers are very careless about feeding up in the fall, which accounts for so much winter loss. A few do not take bee journals, hence the lack of knowledge, and even those who know better are careless about feeding.

The spring of 1909 was exceptionally late for putting out bees, the last three weeks being much later than usual, so that when the honey yield was on the colonies were not in condition to take advantage of the flow.

Altogether the prices were firmer this year than last, although the yield was not quite so abundant.

Division No. 2: Alex McLaughlin, Cumberland.

Taking in about ten miles of country on each side of where I live, we have about thirty-five bee-keepers. The number of hives kept by each varies from two to one hundred and thirty, the average being about twenty. Only a few give them enough attention to receive any profit, and our best bee-keepers are found among the members of our Bee-keepers' Association and who are receiving bee journals. Our local association hold a midsummer meeting or picnic at one of the member's homes, where bees are kept, which we find very helpful, especially to beginners. We hold our picnic about the end of June when the bees are into the honey flow, so that we can have practical work among them. We also find it a help in securing new members. Our district is a good one both for quality and quantity. A single colony has often gathered over two hundred pounds in one season, and one hundred pounds of an average where over a hundred colonies are kept. The quality is also second to none.

In regard to disease among bees we are pleased to receive visits from the inspector yearly, as few of the bee-keepers would know foul brood if they had it and through their lack of knowledge allow it to spread. So far we do not know of any in this district.

Division No. 3: H. E. Eyre, Chantry.

The people interested in the care of bees or actually engaged in this industry in the district which I represent have during very recent years suffered very heavy losses. That reverses of this nature and magnitude would exercise a most disheartening influence over those by whom they are met goes without saying. It seems a very natural result and following on the heels of this discouragement, there comes in a few instances (a very few happily) the resultant apathy and lack of interest which inevitably brings with it the neglect and complete loss of whatever remains of the business in the instances referred to.

As to the cause of losses and reverses I suppose there have been various causes, and they may be classified under various headings: "Unfavorable seasons"; "Unfavorable localities"; "Unfavorable bees"; "Unfavorable Bee-keepers," and a whole lot of other unfavorables, and any one of which may write "Failure," and behind which many a careless bee-keeper finds a convenient place to endeavor to hide his carelessness.

We have a goodly class remaining, however, who are made of the stuff that does not collapse at the first nor second approach of misfortune and reverse; who have confidence in apiculture and are demonstrating that fact. In the hands of this class in our district the bee-keeping industry is recovering from the losses to which I have referred, and this noticeable expansion will, without doubt, be greatly accelerated by the additional good men and true who will, in the near future, conclude to embark in the business of honey production. The season just closing has been quite satisfactory in both honey and increase of colonies. With the improved condition of clover as compared with the same in the autumn of 1908 we may reasonably expect that 1910 will be the banner year. There is and has for some time been a dread of disease among the bees in the district and recent developments as shown in the Inspector's report prove most conclusively that the fear of existing contagion in our midst was well founded.

DIVISION NO. 4: R. LOWEY, WOODROWS.

Bees came through the winter better than for last few seasons, but we had the coldest April, though no heavy frost, I remember since keeping bees. No pollen gathered until 2nd of May. No brooding, hence bees were in poor shape for clover, which, however, was later than usual, which helped some. A fair crop was taken in this section. Bees increased about 40 per cent.; no disease so far as I can learn. I think some advance is being made in bee-keeping in this section, but there is much room for improvement yet.

DIVISION NO. 5: JAS. STORER, LINDSAY.

Bees that were properly put in winter quarters in the fall of 1908 came out as a rule in good order in the spring, the average loss being about 5 per cent. Most bee-keepers put their bees on summer stands about the first week in April. The first week in May would have suited them better. The weather was very cold till nearly the end of May and some spring dwindling took place. The clover honey season was at least ten days later than usual and lasted only from the 25th June till the 16th of July. It came with a great rush while it lasted and most bee-keepers obtained about the average crop given by the honey exchange.

A great deal of buckwheat is sown in this locality and the weather being favorable a good crop was obtained by the bee-keeper that looked after his bees. So much honey coming in late left the hives with plenty of young bees to commence the winter with.

A few honey dealers seemed to be very anxious to get hold of all the honey produced and paid a very good price. Now some complaints are made that they are overstocked, no doubt owing to the heavy crop of small fruit.

On May 25th we had a good meeting of the local Bee-keepers' Association at Lindsay, when we had several addresses from Mr. Sibbald.

DIVISION NO. 6: WM. COUSE, STREETSVILLE.

The bees in Halton and Peel counties wintered in fair to good condition, and were in good condition to commence on clover, which was in good shape during two weeks in June, but owing to dry weather the bloom did not keep as full and fresh in July. Nevertheless bee-keepers here secured a good crop of excellent honey, and have been able to sell readily at a good price.

Red clover yielded very well, and bees stored considerable surplus. Buckwheat, where grown, yielded well, but only a very little grown. Foul brood is almost cleared up in this district.

DIVISION NO. 7: J. M. SWITZER, ORANGEVILLE.

Bees on the whole came through the winter in fairly good condition. Those wintered outside in packing cases, built up very much faster in the spring than those that were wintered in cellârs, which in some places suffered a severe set-back through spring dwindling caused mostly by the long continued cold and wet weather during the spring and early summer, while bees still in their winter packing did not suffer to any great degree from this cause. Pickled brood, which seems to be on the increase in some places, weakened the force of workers for the honey harvest also to a great extent. The yield of honey in alsike clover sections has been very good, above the average in a number of apiaries, while white clover failed to yield honey as in former seasons, especially in the northern portions of the district.

The fall flow of honey from buckwheat, golden rod and other sources has been above the average and consequently bees have not required the usual amount of feeding up for winter stores as in former years.

In sections that were badly infested with foul brood three or four years ago, through inspection the disease has been practically wiped out. There still exists a little of the disease in a few apiaries, but bee-keepers in general understand the treatment required so well we hope foul brood will soon be a thing of the past.

DIVISION NO. 8: U. H. BOWEN, NIAGARA FALLS.

Bee-keeping in this district has about recovered from the effects of the succession of poor seasons during which many small apiaries and some large ones were wiped out, because the owners, becoming discouraged neglected to give their bees proper care. Those apiarists, who, notwithstanding crop failures and small returns, kept their colonies in good condition, have had their reward. Two years of good crops and good prices have made the outlook much brighter. There is comparatively little disease, a large part of the district being entirely free from foul brood. In Welland County, near the town of Thorold, several small apiaries have been destroyed by some, as yet, unknown cause. The bees died after the clover harvest, dwindling away until none were left. The Provincial Apiarist, who examined some of the dead and dying colonies, pronounced them free from foul brood. It is the general opinion, although it has yet to be proven correct, that the trouble is caused by the poisonous fumes from a smelter recently built in that neighborhood for refining silver ores from Cobalt. This is a matter that should be thoroughly investigated, as the bee-keeping industry in Thorold township appears to have received a death blow.

DIVISION NO. 9: W. J. CRAIG, BRANTFORD.

I beg to report bee-keeping conditions in this district as being very satisfactory the past season. An average honey crop has been secured and bees are in fairly good shape for going into winter quarters. A large amount of feeding has had to be done as brood chambers were left comparatively light in store. Where proper attention has been given to this we need scarcely fear for the wintering. We have held semi-annual meetings of our County Association and a district winter convention at Brantford. The latter was particularly successful.

DIVISION NO. 10: D. CHALMERS, POOLE.

I beg leave to report that I have communicated with a number of bee-keepers scattered over the district, and gather from reports received that in the northern part of Grey their bees were not in the best shape for a honey harvest, or their owners would have got a fair crop. In many parts of Perth County the same can be said of bees there, as there seemed to be considerable loss last winter. Many colonies that did winter over dwindled out in spring, and a good many survivors were weakened through being affected with dysentery, but those who had bees in good shape in Perth harvested an abundant crop. The latter part of June and early July were exceedingly dry and threatened a failure, but we were blessed with a three-inch fall of rain in the evening of July 10th, which changed conditions entirely. Reports from Bruce are good, but from the west and south of Huron they do not report so well. In some cases they report only a half crop.

As far as reports go on condition of bees for winter, they are in general all right.

DIVISION NO. 11: W. A. CHRYSLER, CHATHAM.

The bee-keeping industry in this district is progressing very favorably. Improved methods are being made use of in many cases, and an increased interest in bee-keeping is being taken. Many are anxious to increase their number of colonies.

The yield of honey per colony has not been large, yet giving a fair return for the labor. The demand for honey is good. Prices on the local markets are, on the whole, very fair. Owing to the increased number of bees kept in this district, the local market has been well supplied.

DIVISION NO. 12: DENIS NOLAN, NEWTON ROBINSON.

The season of 1909 in this district was quite favorable to the bee-keeper. The winter was not very severe; the greater part of the bees, being wintered out-doors, came through in good condition.

The spring was cold, wet and backward, the result being that the colonies did not build very rapidly, especially weak ones, so that the honey flow was on before all the colonies were of sufficient strength to store surplus.

Clover yielded well for a time, but was cut short in some localities owing to drought. Basswood yielded fairly well in some localities, in others little or nothing. A yield of 75 lbs. white honey was about the average, while upwards of 100 lbs. was also reported.

Buckwheat yielded much better than it usually does in this district. Honey found ready sale at the prices suggested by the Honey Crop Committee, a large portion of it going to the western provinces.

This district received very close inspection for Foul Brood during the year, but the disease seems to be more under control than formerly.

Mr. Herschiser moved, seconded by Mr. Holtermann, that the Ontario Bee-keepers' Association and the bee-keepers of Ontario and Canada generally, extend an invitation to the National Bee-keepers' Association to hold their next Annual Meeting in Toronto. Carried.

REPORT OF TRANSPORTATION COMMITTEE.

By J. D. Evans, Islington.

The only matter of importance that came up during the year was that in reference to the express rate on extracted honey in cans. It was found that maple syrup, milk, cream, and other fruit and dairy products were being carried by the express companies under what is known as the "special merchandise" rate. This calls for a reduction of about 25 per cent. on the rates for the general merchandise class, under which extracted honey is at present carried.

The two express companies were communicated with, and asked to place honey in the same classification as these other products. The Canadian Express Company through their Vice-President replied that they could see no comparison between these products and refused the application. The Dominion Express Company replied that in 1908 they had under their new classification given honey the same rate as milk, cream, and maple syrup, etc. This classification, however, owing to some irregularity was cancelled by the Dominion Railway Commission. If the Commission were favorable, the Dominion Express Company officials would give extracted honey the same rates as the other products mentioned.

The secretary of the Board of Railway Commissioners was communicated with and a formal application made to the Board that extracted honey in cans be placed in the special merchandise class. A reply was received from the secretary of the Board stating that the express classifications were under consideration at the present time, and that until some definite announcement was made he could not give any direct answer to our application. The matter therefore rests in that position at the present time.

RESIGNATION OF MR. M. EMIGH.

Moved by M. B. Holmes, seconded by W. Couse, "That whereas the Ontario Bee-keepers have for a number of years enjoyed the services of a most faithful and painstaking official in the person of Mr. M. Emigh, of Holbrook, and whereas he has during all these years not only given perfect satisfaction as Treasurer of this Association, but has in addition become a friend beloved by every individual member of this Association; and whereas he has concluded to resign his position as Treasurer and has tendered his resignation in fact; Therefore, be it resolved that we, as an Association, in convention assembled, as we stand at the parting of the ways in this particular, give expression of our regret that Mr. Emigh has found it necessary to take this action, coupled with the hope that we may enjoy his presence for many years to come in our annual conventions, and further that the best thanks of this Association be tendered our esteemed friend, Mr. Emigh, for his many kindnesses, excellencies of person manifested and general assistance so cheerfully rendered during all these years."

The Vice-President put the motion, which was carried unanimously, with applause.

Mr. Emigh: I assure you I appreciate this vote of thanks, although I do not really know that I deserve any vote. I have been paid a small salary for what I have done, and to get that and to get a vote of thanks thrown in, why, it seems something extra. But I don't expect to leave you entirely. I hope to be with you for many more meetings. I am pleased to say that our meetings are much better than they used to be, so much more interesting, so much more beneficial to the bee-keepers; and I trust that the Association will keep on in that direction.

ELECTION OF OFFICERS.

The election of officers then took place and resulted as given on page 4.

THE IMPORTANCE OF RE-QUEENING.

By H. G. Sibbald, Claude.

A number of years ago I had an experience with feeding back to finish up comb honey. I produced a lot of comb honey and always had a number of unfinished sections, and I would put two or three cases of sections on to a colony and feed back to have them completed. I noticed then that as soon as a colony got the swarming fever the bees would not take any more feed down or build any more comb. I have noticed more and more ever since that just as soon as a queen begins to slacken up in her laying that the colonies will slacken up in their working energy, and a queenless colony will not work equal to a colony having a good laying queen. This led me to observe from time to time the difference between a colony with a good queen and a colony with a poor queen, or a queenless colony. I think there is half as much difference in the work accomplished by a poor queen in the hive. Later on when I had occasion to go around amongst the bee-keepers and farmers I again noticed the degenerate stock that there was throughout the country. All these things have led me to place a good deal of importance on the subject of queen rearing and requeening.

There are very few bee-keepers outside of some that attend our conventions, that pay any special attention to their queens. A great many bee-keepers never had a queen cage.

Winter losses are from several causes. I think perhaps half as much loss comes from poor queens or queenless colonies and those that have drone layers, and they come out in the spring and you know the result; they are very little use. Winter them as well as you like, and you are one colony less. In wintering, a colony that is queenless will not winter well, or one that has a poor queen. They know there is something wrong, and they will try to supersede right in the cellar, and in outside wintering I haven't any doubt they will do the same.

As we run bees in a large way and keep them going for all they are worth, a queen does not last so long. Mr. Pettit pointed that out. If we have an early flow of white honey only, the queen lasts longer than if we have a fall flow.

I think that re-queening is one of the most important things bee-keepers have to consider. The queen end of the bee business is more neglected by the general bee-keeper than any other part of the business.

Every bee-keeper should learn to produce queens for himself. It is all right to buy queens to improve your stock. At any time you notice a failing queen she should be immediately changed for a good laying queen.

The next important thing is the strain. There is very little use in changing a queen unless you make some improvement. It is a very good trade to trade off an old queen for a young one. It would not be a very bad thing to do every year. You could afford to pay quite a bit of difference on the bargain. A young queen is worth a good deal more than an old queen, and is not so liable to fail. Some advocate raising queens from swarming colonies and natural queen cells, and so on. The great objection I would have to that is that in raising our queens from swarming colonies we are encouraging the swarming propensity, and in a large apiary, or for a man that has more apiaries than one, the swarming tendency is a very big fault; and even a small bee-keeper can get far better results if he can keep his bees from swarming altogether and keep them working right along. I would never advise anyone raising queens from cells that were raised under the swarming impulse. As far as I know this year we did not keep a cell that was raised under the swarming impulse. We raised all our queens from colonies that did not swarm. We are trying to breed out, and I think we will succeed to a great extent in breeding out the swarming tendency, and that will be a great help to us. When you have a large apiary it is impossible to have the outfit to let them increase to such an extent. If we have any natural queen cells we destroy them.

The opinion of most bee-keepers that have experience with the different diseases is that Italian bees are better than any other bees to fight off disease, and that has been my experience. The working quality is the important quality in any strain. If a colony will not work well and gather lots of nectar it doesn't matter what strain they are, they are no use. It is honey we are after. We should select for our breeding stock a strain of bees that are good workers. We cannot get this always when we are buying. It is not advisable to get all your queens from one man. I would always advise anyone in buying new stock to breed from queens bought the first season; test them well first and notice what they are going to do. I have heard lots of people express themselves that they would have given $100 if they had not got a certain strain into their yards. Do not encourage new strains until you find out they are better than, or as good as you have anyway.

On red clover this year we found some bees that would store a surplus and other colonies that were equally as strong did not seem to gain a bit. Some colonies actually filled a super of red clover honey. The strains of bees are different in their ability to get at the clover. As far as buckwheat honey is concerned, the blacks were just as good, if not better, than the Italians. It is a comfort to be able to handle a colony of bees without too much punishment. If we have neighbors it is a good thing to have bees that are quiet. If we can get a strain that can work well and have the virtue of being reasonably quiet, I would encourage that quality in my yard. I think you can get those that will mind their own business and work.

Then as to the prolific queen. Some people prize that greatly. That to me is a fourth or fifth point. You have a colony that is prolific, that is a joy to you, but as soon as the clover comes out they will sulk and will not work, and another colony that was not nearly so prolific gets away ahead of them when it comes to getting honey into the super. I look for the other qualities first, and then a good laying queen is always in order. I have inspected yards where there might be 20 colonies of bees, and out of the twenty you could hardly find ten that had queens that were doing anything like they should do, and there was a failure on account of having poor old queens.

Every year when we clip our queens we mark the date on the hive with a pencil so that it won't come off until that queen gets out of there. If we clip a queen this year we mark "C" for clip and "9" after it. If we come to a queen that has been clipped we just mark "C" on that hive. In that way we can always tell if the queen had been raised previous to last season, and all those queens with "C" on must be changed this season. Those queens with "C. 9" on, we might not change at all. If we find a colony doing good work and putting up lots of honey, and we think they are a valuable strain, we like to keep them because we think we gain a little point in drones that might be produced from that colony, and they will have a good influence over the breeding in the yard the next season.

I think every bee-keeper should have in an apiary of 100 colonies, 15 nuclei. By re-queening as you notice the queen failing you do not have all your work to do after the season. There is no robbing going on; you can find your old queen very easily because all the bees are out in the field, and they accept a queen readily, and everything goes like clock-work.

Mr. Ross: What would be the objection to slipping in a cell protector and putting them in immediately?

Mr. Sibbald: That is practiced by queen breeders, and I thought that would be a good plan, although I have never used the cell protectors. You are generally in the yard one day a week. This season we repeatedly took cells from one yard to another with us in the rig and used them in the nuclei there. Mr. Adams, I think, advocated grafting the cells into full colonies, but with my work in three large yards, I have found that I would prefer to have them mated in nuclei, and when I could see they were laying and in good condition, then I would introduce them. Putting them into full colonies they sometimes get lost, sometimes mismated and sometimes are not what you would like afterwards, and you have the trouble of hunting them up in the full colonies and re-queening. I would not care to have colonies queenless the ten days it takes the queen to mate and start laying. I think it is important to have a laying queen in the hive every day. In running out-apiaries, when you are not there all the time, if you put cells in in that way they will start cells all through the hive, and you have to hunt them out. By putting in a good laying queen you will not have that trouble. I have been quite successful in transferring them from nuclei to full colonies without much loss. Queen rearing does not give me any particular trouble. It is a pleasure; it is a rest; I like to get an hour or so to attend to them.

The best way I know of for making those nuclei is to take up two combs of brood into the top storey and fill in the spaces below with full sheets. Then in a week's time you can take that brood out, and the bees adhering to it, and start two nuclei, using a division board or a small hive like Mr. Adams had here to-day, and put in your cell shortly afterwards and everything will go all right.

In introducing queens we usually put them on top or down between the frames. A plan that works very nicely through the season when gathering honey is to catch the old queen and put her in a cage, and then put the queen you wish to introduce into the colony after a little while, when they begin to realize their queen is gone; then afterwards change the two queens, take the old queen out and put the young queen into the cage that the old queen occupied, because it has the scent of the old queen. If the old queen is to be killed, rub her body over the cage. In finding queens I do not know of any particular way, only to go at it and go over the hives. You must not smoke them very much, you must not get the bees running, you must not excite them; be gentle about all your manipulation. The better time to find them is in the daytime when the bees are out in the field.

Another plan, if you ever get stuck, is take an empty hive and transfer the combs as you look them over into the other hive, and perhaps you will find the queen on the bottom or some place. You are sure to find the queen that way.

Mr. Dickenson: That is the proper way to do it anyway.

Mr. Sibbald: No, I would not think of doing that until I had looked through the hive.

Mr. Dine, New York: If I was going to re-queen my yard I would not start nuclei. I would go to a swarm that I wanted to raise the queens from, and draw out some of the brood sealed over, and insert empty combs so that the queen could fill them. Two days afterwards I would go to another swarm and get that in shape, and take these two frames and put in just the egg and let the bees raise it from that. When these queen cells had got in proper shape in about twelve days I would take those queen cells out and put them in protectors on the colonies I wanted to introduce these queens to. Catch the old queen, and at the same time put the queen cell in the protector. I would do away with all the nucleus business, and I do not think the loss would be any greater from flight among those young queens from the whole colony than it would to raise the queens in nuclei and introduce them into the colony.

Mr. Holtermann: I would like to uphold Mr. Sibbald about this red clover queen business. I found just exactly what Mr. Sibbald found this year, that there were certain colonies—and let me say at once I have not had time to keep track of what they are so that I would not be able to supply any queens from that stock, and I do not breed queens anyway—I had a percentage of colonies that gathered a considerable amount of red clover honey when others gathered nothing at all.

Mr. Sibbald spoke of the prolificness of the queen, putting that third or fourth. I admit that there is a difference in traits, but give me the colony that has the bees, and in nearly every case you will get the honey.

Mr. Sibbald spoke of the importance of always having a laying queen in the hive. I emphasize that as strongly as he does. The advantage of a prolific queen is that she continues to occupy that brood chamber with brood and does not allow the crowding out of the honey; and if the queen is not prolific there is a constant decrease in the capacity of that brood chamber. It becomes practically a honey super. Mr. Sibbald said he was seeking to eradicate the swarming impulse by not taking the cells raised under the swarming impulse. That interested me very much.

Mr. Hurley: My idea of discussing this question is entirely the discussion of re-queening, its advantages over the old-fashioned way of leaving your queen in the hive for two or three years. I consider the advantages of re-queening annually are very great to the bee-keeper, whether he be experienced or non-experienced. I suppose my remarks would be altogether uncalled for to those who are experienced men, but of course we must always consider we are speaking to a certain number of graduates who are constantly joining our ranks. It is very largely for their benefit we discuss these problems. I would say that the bee-keeper's year ends with the close of the white honey flow; taking that as our starting point, I consider that his work after that is preparatory for the coming year. Therefore. if that be the case, I would say that his best policy is to immediately re-queen at the end of the white honey flow. If he does, he puts his hive in the possession of a new, young and vigorous queen that will give him a young, active, vigorous lot of bees to go into winter quarters. They will also be effective for gathering a fall flow if he has one. But, the prime point to this is that he has a new queen put in his hive immediately after the close of the white honey. That is one of the first necessities for good wintering. Having your good stock for winter, I will assume that you know how to winter your bees. That is no part of our present discussion. You have a minimum of chances that you are going to lose your queen during the winter because she is a new, young and vigorous queen, and the probabilities are she will come through the winter more successfully than if she were an old queen.

Having come through your winter you enter into your spring work. As you enter into it you have also the assurance and the further satisfaction that you have a young and vigorous queen in your hive. You know that other things being equal she is going to be able to stock that hive well with young bees, and you are going to come into your summer flow with a good hive full of bees. At the end of the honey flow you have done with that queen, you have exhausted her, and you will renew her again, and so the process will go on. That to my mind is the philosophy and utility of re-queening.

MR. ANGUISH: As Mr. Sibbald said in his outline, this is one of the most important things to the bee-keeper. I say it is *the* most important thing in bee-keeping, that is looking after your queens. As soon as the honey flow is about at a close I re-queen my yard all over as much as I can, but not to kill everything off; that is going a little too far. You have got some colonies in that yard that have given you some great results that year. What are you keeping them for? Those are the ones I want to breed from next year. I want to get some queens from that colony and raise queens from them. That is where we get our bread and butter, from the good stock of bees we have got. We all know that queens vary, and they vary sometimes in seasons too. Take one season, a queen will do extra well; she will not do as well the next, but you can raise good queens from that one.

MR. ROSS: I was very glad to hear Mr. Sibbald say he enjoyed looking for queens. I am so situated that I have to get to work at my bees early in the morning or after 6.30 at night, at both of which times the hives are packed with bees, and I have experienced a good deal of difficulty in finding queens at that time. Can anybody give me some scheme whereby I can get those old queens to supersede without too much difficulty?

MR. MCEVOY: As a rule about six o'clock in the morning the queens are on the first three frames in the centre, and they go in a circle around. They are at one side or the other at six o'clock in the evening. I want plenty of bees. I could not agree with Mr. Sibbald in that.

MR. SIBBALD: I meant you should not choose to breed from the most prolific queen you had just because she was prolific.

MR. MCEVOY: That depends on the training you give these bees. You can get the work out of these bees if you set them to work right, and the more bees there are the better. Mr. Dine took a short cut that was well worth paying attention to. I have practiced the same thing. I like it first-rate. I will get more profit out of young queens than old ones. Someone will say, I have had queens to do so and so at such and such an age. Yes; you can get good men at 70, but you can get more good men at 40.

MR. DINE: I am a firm believer in re-queening, but we are taught that a queen lives from three to four years. Is it possible for a queen to get to her best in ten or twelve months? If I had a queen that laid a comb full of eggs do you think I would change her the first year? No, I would keep her for two years or more. I go, personally, more by the looks of a queen. As long as she is bright and yellow and filling the combs full I would keep her till she showed more signs of failing.

Mr. McEvoy: That will all depend upon the work you take out of that queen. You keep her confined to the brood chamber only; you raise no brood to the super?

Mr. Dine: That queen will wear out in two or three years in that way.

Mr. Herschiser: The question resolves itself to this: Do away with all your poor queens and keep your good ones. Mr. Ross wanted to know how to find a queen, and there are several ways of doing it. I would like to call your attention to one or two: By taking the frames out one by one and shaking the bees off at a considerable distance, stringing them along on a sheet if you please, and getting them to run in, and if you watch them at the entrance you will soon find the queen. Another way is to put a queen excluder over the hive and shake the bees down, and as they run through it will strain the queen out, and you will find her on top of the queen excluder.

THE USE OF THE GASOLINE ENGINE AROUND THE APIARY.

By D. Nolan, Newton Robinson.

The subject on the programme is "The Use of the Gasoline Engine around the Apiary." Perhaps that would look better if we would say "to the bee-keeper." He need not be using it around the apiary all the time. There is a great deal of prejudice against the use of gasoline engines. I attribute that mainly to the make-up of the engines in earlier days. I think it is a mistake to confound the engine of to-day with the one of some years ago. They have them perfected and improved so that the trouble is almost a thing of the past. I cannot see any reason why any person should hesitate for a moment. The use of the engine of course to the bee-keeper is simply a means of saving labor. I often compare bee-keeping with other pursuits, and it strikes me we have not as many means for saving labor as they have in other lines. I think the farmer is a little ahead of the bee-keeper in this. I think the farmer does at least twice as much or more work to-day than in the past, with the same amount of labor. The use of the gasoline engine or any kind of chemical engine in the country, is of very great importance because they are always ready and handy, and you can have a light one or heavy one, whichever your occasion demands. You do not need to spend half a day getting up steam before you are ready to use it. They are ready to use in half a minute's time. The main use of the engine to the bee-keeper of course is for extracting purposes, to drive the extractor. That is mainly why I got mine. At the present time I can say it is past the experimental stage with me, and it has come to stay. The engine I use is an air-cooled, one-horsepower engine, and weighs about 196 pounds; there is no cumbersome water tank, and I can put it on a wheelbarrow or take it into a light run-about waggon to the out-yard and put it in the honey house and have it running in a very short time. The extractors I use are the ones I had before I got the engine, and in trying it I simply tried it on those extractors. I had three four-frame extractors. I got one first, and I liked it so well that I got one for each of my yards. They are cumbersome to move so I arranged my engine to work on those extractors. They are four-frame reversible extractors made by the Brantford people, all of the same style. The only difficulty I see in those extractors and others is that the motion has to be reversed, and you must have a connection between the engine and extractor that will reverse the motion to turn the extractor one way and stop it and reverse it and work the other way. It worked very nicely last season, and this summer I thought to make a little improvement, and the result was I broke a casting on the engine just about the time I was busiest, and not being able to make out the number on the engine of the piece, I was unable to use that engine for about a week. I had to employ a man to turn the extractor or else turn it myself, and I never appreciated the engine so much as I did in those warm days when it would not go. After I got that piece and got it started I appreciated it very much more than I ever did before. The engine will do the same amount of work as a man for fifteen or twenty cents a day, and from a financial point of view it is certainly a paying investment. I have extracted something over 30,000 pounds with mine since I got it, and I think with the extracting and other work I have done with it the engine really does not owe me anything.

I did not have an opportunity of testing the different makes of engines of that size. Around through the country you will find amongst the farmers all sizes and makes of engines. I will say I never lost more than two hours' time trying to get it to go, and that was not really the engine's fault, it was the fault of the batteries. If your batteries are good and your gasoline is good there is no reason why you should have any delay in making your engine go satisfactorily.

In regard to the use of the engine for other purposes besides extracting, while it is only a one-horse power engine you may think it is not of very much use, but nearly every bee-keeper has a horse or cow, and you know what a task it is if you are going to feed a little cut feed. I take the engine out to the barn and cut the feed. Another use, we had a Barnes foot and hand power saw; out in the country we have a certain amount of work like that to do, and I make my own boxes. I buy the lumber there and get it re-sawed, and get my boxes at a very small price. This can be done in the winter time, and in that way you can use up your spare time to advantage. You put one of those one-horsepower engines on one of those saws, and you have a perfect machine. Lots of people say to me, who made those boxes for you? I am not a mechanic, but I have made hives and sold them, and ripped out supers and have done the work myself. While I have had that done at the planing factories at home, I feel safe in saying the way I did it was done to my satisfaction. You generally have to get them from the supply dealer. Another use I put it to is to cut cordwood by putting the engine on to a circular saw.

PRESENTATION TO MR. WM. McEVOY.

Mr. Holmes called Mr. McEvoy to the front and presented him with a purse of money and read the following address:

Dear Friend McEvoy:—The beekeepers of the Province of Ontario, and the members of this Association in particular, who feel themselves under great obligation to you for the magnificent services rendered through your discovery of a simple and effective remedy for the cure of foul brood, desire to take this opportunity of expressing their appreciation of your inestimable services, and as a token of regard, beg you to accept the accompanying purse. We consider it but a small return for what your skill and inventive genius have done for us.

To give you an approximate estimate of the benefits resulting to kee-keeping in this particular would be quite impossible, as it will continue to be a benefit so long as time and circumstances endure. You have made the name of Canada famous throughout the world by your apicultural triumph. This is the first opportunity we have had of meeting you since your retirement from inspectoral work and we cannot allow it to pass without going on record in testimony of the great service you have rendered us and the bee-keeping fraternity throughout the world.

We beg to impress upon you that we are not unmindful of the great pecuniary sacrifices you have made in our interests, and take this means to at least express to you our gratification and admiration.

We trust that you may long be spared to continue your work with the bees, taking comfort in the thought that your altruistic motives have been recognized and appreciated, not only by your associates, but by the bee-keeping world at large.

Mr. McEvoy, in accepting the presentation, expressed his appreciation and stated that it had come to him with the greatest surprise, as he had not expected anything, and he was very thankful to one and all; that when he had accepted the appointment of foul brood inspector some nineteen years ago it had been with diffidence; he felt that he was not capable of filling the position and did not feel that he could afford to give the time to it; that during the nineteen years of his inspectorship he had never had a case in court. He wished to say once again that he was very thankful for and appreciated very much the honor which had been done him in making this presentation to him.

THE PROVINCIAL APIARIST.

The President called for suggestions from the members with reference to experiments that might be made by the Provincial Apiarist; he thought it would be very beneficial all around and would be helpful.

Mr. Holtermann: I believe a proper work for this Department would be to seek to see if anything could be done in the way of controlling the fertilization of the queen. In my estimation the experiment station should be equipped with facilities for inside wintering, where ventilation, temperature and humidity can be absolutely controlled; I am desirous of seeing a station that is the very best in the world.

Mr. Pettit: I have this matter of the control of the mating of queens in mind. It is of prime importance that we learn to control it so that we can breed certain strains. So far I believe it has really not been successfully controlled. Some comparative success has been reported. I understand Mendel, who has done so much for research in heredity, conducted extensive experiments along this line. We do not know how successful he was because all of his notes on bees unfortunately have been lost.

As to wintering, steps are being taken to carry out these experiments. The main obstacle is the matter of sufficient equipment, and it will take a little time to get the expensive equipment necessary to conduct these experiments in a really scientific way.

Mr. Evans: It has occurred to me if the experimenters could get control of a large greenhouse and get some hives in it, and get the bees accustomed to staying there, and then try experiments with queen mating, they might succeed. I think it is important we should also get some data as to the proper temperature for keeping bees in the winter. I am of the opinion we keep them too hot. Mr. Davidson keeps his bees almost at freezing point, and he is one of the most successful bee-keepers we have.

Mr. Sibbald: My idea with the experiment station would be to get at things that will not cost too much at first. There are many little practical things that the different bee-keepers who keep a lot of bees really cannot understand. There is the question of wintering bees, the temperature and the ventilation of cellars; then wintering outside, as to whether you should have packing underneath or whether there should be one or two or three inches around the side or on top, etc.

Yesterday it was brought up as to whether queens artificially raised or grafted are as good as natural queens. I can think of any amount of other little things that bother us more or less to just give an answer as to which is best, and as it comes to be recognized that these things are appreciated and important and telling in the bee-keeping industry, there will not be so much trouble getting more money to try these more elaborate experiments.

Mr. Holtermann: To put packing or no packing under a hive, to set a group here and there, you will find some that have wintered well and some poorly in each. Supposing those experiments were conducted, I do not see that we are going to gain so very much, but what in my estimation we want to do is to test principles and go behind them, and we want to get the necessary funds to do that rather than go into the minor details in the matter.

Mr. Pettit: It seems to me that Mr. Holtermann's suggestions are more along the right line. The point I see is to get at fundamental principles. Take this matter of the temperature of cellars, we are all testing that. I know men who have wintered successfully at a temperature of 35 degrees; others claim to winter as successfully at 45 degrees to 50 degrees. There are so many other conditions that come in in connection with the management that it requires a very complete equipment, and unless you have a rather expensive cellar arrangement you do not know that you are controlling the temperature, ventilation, and humidity.

Mr. Ed. Dickenson, N. Glanford: I think the locality will have to be considered. Let the men who are thinking of going into the wintering problem use whichever method they think best and find out the same as the rest of us. I do not think you could put down any hard and fast rule for outdoor wintering.

Mr. Timbers: 90 per cent. of the bee-keepers throughout the Province have to use the cellars they have.

Mr. Dickson: The experiment station is all right, but the question of experiments on wintering I doubt. There are many little things in which the experiment station will be a help to beginners and save them many dollars. On the question of wintering, unless it is an outside cellar it will cost a great deal. I certainly would not advise an experiment station for wintering, for the simple reason locality has everything to do with it.

Mr. Chrysler: I think the Station should take up the question of capping melters or some plan for treating cappings.

Mr. Pettit: We are working on that now.

Mr. Chrysler: I think apparatus for assisting the progressive bee-keepers and lessening the work and labor in the production of honey would be a good thing.

Mr. Timbers: I think it would be more beneficial to the general bee-keeper to experiment along the lines suggested by Mr. Chrysler.

Mr. Armstrong: I rather like that suggestion of Mr. Chrysler's. I think that would strike nearly every bee-keeper. Mr. Pettit and I were talking about the apparatus necessary to run a yard all the way through, power outfit and extractors and capping melters, and all things along that line. If such things were all tested at the Station every bee-keeper all over the country would not be trying them.

Mr. House: Where would we be to-day if it were not for science? If you can get an experimental station, it will do something in a scientific way to uplift your industry.

Mr. Clark: It seems to me the question of disseminating information would be a good thing; that is, to issue a pamphlet giving the best method of producing comb and extracting honey and everything that goes to successful apiculture, and send those pamphlets to every man that can learn how to keep bees. It may be a means of making better bee-keepers of those who are now a detriment to the industry.

Mr. Hodgetts: Mr. Pettit is already working on that suggestion. I feel that outside of probably some of the text books we have nothing in the Province we can send to the bee-keeper. A lot of men starting in bee-keeping want a good, practical hand-book, and we have nothing to give them, so I have asked Mr. Pettit to prepare something this winter for our reports. Mr. Pettit can get all such information together, and tell the men how to winter outside and inside. Mr. Clark's suggestion I think is a very good one, and we will have something I expect by spring to distribute.

In regard to the scientific or practical side of the work, our College at Guelph has to be practical. At the same time, they are doing very good scientific work, and there is no doubt that Mr. Pettit can follow such lines, and we can get good results from both. We have endeavored to make all the experimental work at the College first of all practical, so that our bee-keepers, or men in other lines, can come there and see what is being done, and can be done on the farm. In regard to the experimental work in connection with roots and field crops, there are thousands of visitors who go there every summer and see the results of the professors' work, and there is no doubt it has resulted in bringing millions of dollars into the pockets of the farmers of this country. Mr. Pettit has a tremendous field for working along scientific lines, and I am hoping he will be able to combine the two.

The following motion was then carried:

"That the Members of the Ontario Bee-Keepers' Association view with alarm the fact that cases of European foul brood have been found among bees in Ontario; that we desire to place ourselves on record as, 1st, strongly favorable to action on the part of the Government, which shall, by thorough and careful inspection, locate every hive affected; 2nd, That the Provincial Government take any action necessary which shall enable it to secure complete control of affected colonies, destroying them."

It was also moved and carried that the Executive, in connection with Mr. Pettit and Mr. Sibbald, be a Committee to re-draft sec. 4 of the Foul Brood Act, and that they have full power to act in the matter.

QUEEN REARING.

By P. J. Clark, Borodino, N.Y.

I think you will all agree with me that there is nothing that the apiary depends more upon than a good queen. Give me a good queen, one that can be brought up to the highest egg production at the time I want it, and I will assure you a crop of honey, but with a poor queen that you have to coax for eggs, the flowers often bloom in vain.

My object in coming here is not to give you a scientific lecture on queen rearing, because you can all read that in the books for several books have been written by eminent authors. But what I want to do is to take you by the arm and lead you around through the apiary and show you the practical work of queen rearing, and the implements and tools, and just how it is done. I understand how you may read about all this and partially understand it, but some way or other the people want to see the picture, to see it demonstrated—a sort of kindergarten as it were. From the consensus of opinion yesterday I am well satisfied that a great many of you are dissatisfied with the queens you are buying from queen rearers, and therefore I want to teach you how to raise them yourselves, and see if you are more satisfied. You probably will be. With that idea I have brought up my queen rearing paraphernalia, and I will proceed with a practical demonstration of queen rearing.

After we take bees out of the cellar in the spring, just about the 1st of April on an average, the first thing we do is to select three or four or half-a-dozen of the strongest colonies and endeavor to build them up as fast as we can by giving them brood from other colonies. The hive we use is a ten-frame movable hive, and when we get the colony up so that we think it has young bees sufficient to start brood rearing and raise queens we take a ten-frame hive and divide it off with a queen excluder. The first thing to do is to make queen cells. We make those in the winter. I do not believe there is one out of ten here who knows exactly how to go to work and make them right. I use a common rake tooth for dipping. They will accept these cells as well as anything else. The rake tooth is made of hardwood. The first thing you do is to have a little stick notched so that the tooth lays right in the notches. You wet this rake tooth in water for half an hour so that the wax will clean off. Mr. Doolittle, on measuring natural queen cells, found they were about half an inch deep, and therefore he cut a notch on the stick 9-16 of an inch from the end, which makes the first dipping about that length. After being wet you put it into melted wax up to that notch the first dip. You give it about three dips. The next dip not quite as deep, and the third one not quite as deep as that. Then place it on the stick. Then take another tooth and do it the same way. Twist it around and have the wax round at the bottom so as to make the bottom thicker than any other part of it, and that protects the cells when you handle them. You put about six of those teeth through in that way. Once done, you twist it off when you want to put it on the cell bar. Here is a cell bar, and I put sixteen cells on that. After the sticks are prepared we go to the queen breeder and take up a comb. Select larvæ as near as you can from 24 to 36 hours old, preferably 30 hours. To tell that, a beginner should put a laying queen into a hive of empty combs, and she will lay immediately, and then he can tell age. They hatch in three days, and by the size of the larva when it is 24 hours old he can tell. When it is 24 hours old it is about in the shape of the letter "C." When you select a comb and find a piece with larvæ about the right age, you cut a piece out. In order to get at the larvæ easily, you shave off the cells with a knife down to about 1-10 of an inch.

In the spring we have to make a colony queenless in order to get royal jelly. We take a cell of royal jelly when it is about three to four days old, and dilute it somewhat with saliva. Take a small stick and stir it up with an ear spoon till you get it uniform, then take that ear spoon and dip out about the size of a double B shot and place it right in the queen cell. Go along and do each one till you go across the whole bar of cells. The object of putting royal jelly in there is to give the larvæ something to feed on. Take a common goose quill and dip right under the larvæ, lift it up, place it in the cell, and that royal jelly being in it will remove it from the quill when you push it away from it.

After I have gone across the whole lot of cells I put it up to the window so that the light will strike across it, and you can see every one, and if you have skipped one you can put it in. For that row of sixteen cells, one good cell of jelly three or four days old will be enough to supply them. The only object of putting the jelly in is to facilitate placing the larvæ in there, and to keep the larvæ feeding while you are transferring it. You want to be careful and not get your royal jelly too thin, or your larvæ will float out.

Before we have the colonies strong enough to make two hives, I use the excluder, and I have four combs removed from the side. The farther comb I put full of honey on the extreme outside. The next is the comb of open brood, and the next comb is spaced to insert the cells; and next would be a comb of sealed brood, and the remaining combs on the other side of the partition you place unsealed larvæ up next to that, and place honey on the extreme outside. You space these combs the night before if possible, and that space will fill with bees. The next morning put in the prepared cells.

Mr. Sibbald: Is that a queenless colony?

Mr. Clark: No, keep the queen in the compartment on the other side away from the prepared cells. You cannot rear queen cells unless you have got strong colonies and plenty of young bees. This is the first step in rearing queens in the spring—about the latter part of May. I have had them draw out the whole sixteen. Later on when the colonies get still more populous you put a queen excluder across the hive and place another hive on top, keep the queen below and move the brood above, and then give them additional brood from another hive, filling the top storey full of them. Then place your row of cells you have prepared in the top super and brood on each side. I have had four or five of these frames going at once, and by the eighth day you go down below and get some open brood. You want open brood all the time in where these queen cells are. This is in the swarming season when you people want to raise queens.

Mr. Galbraith: Do you ever cut the mouth of the cell, providing there is one not so amply fed as the others are, so that they will put the jelly in there?

Mr. Clark: No, I destroy it; I don't take any chance. You will have no more trouble in rearing queens from Italians than from the black races; they will rear just as good, and I do not know but better, because they do not start so many. To start your cells, they would be the better bees to use.

In order to melt your wax for cell cup making, take one of these one-wick little oil stoves. You want your wax just about the melting point all the time, and keep putting wax in.

After the cells are drawn out, we keep a record in this order: The date when the cell was made and inserted, the name of the queen from which the larvæ was taken, the row in your apiary on which your queen rearing hive is placed, the number of the hive, the number of cells that are inserted, the number that were accepted, the time they were put in during the day, when they are ripe or due to be transferred to nuclei. I keep that record in the office. After the tenth day we calculate to distribute these cells to nuclei. They won't hatch probably till about the tenth or twelfth day after grafting. As to their hatching, the season of the year and the weather makes a great deal of difference.

Mr. Timbers: Do you find queens that hatch in twenty days as good as those that hatch in fifteen?

Mr. Clark: I do not think so. The longer they wait in there the darker they get. We make a lot of nuclei frames, and in the spring I insert them into a lot of full colonies all around, right in the centre. When I want to make nuclei, I take sixteen of those boxes and go to the out-apiary, and generally in the spring I put queen excluders on as soon as the bees will stand it, and put a storey of empty combs on top so that they will go up and work in there, and it keeps the drones out, and when you go along you have a funnel that is oblong on top and will fit into this hole in the bottom. Set these boxes down on the ground, insert your funnel, and shake the bees, and you have a section placed in the box partly filled with honey for the bees to feed on. Shake them and they go in there without any trouble; and then go on with the next one till you fill the boxes all up. Then we take them home. We try to have virgins, but if virgins are not hatched we take ripe cells, due probably to hatch the next day, and insert them in cell protectors. There is a partition, and there is a five-eighth inch hole through there bored with a bit. Place that in the hive and it takes a twin nuclei. I take a frame of sealed brood, preferably out of the hive that I had these frames in, insert that frame of brood up next to the division board, then put on the frame of honey, and maybe that is all I put in to start with. As they prosper you can add combs, and they will draw them out. Seventy-two hours is about the ideal time the colony should be queenless before the queen emerges.

Mr. Herschiser: You always introduce a virgin queen in the way you describe?

Mr. Clark: Yes. Here is the follow board. This will hold half a teacupful of honey. The object of that is in the fall queens are slow to be mated, and in fact they will not act at all unless you give them a little stimulus by feeding warm syrup in there along about 11 o'clock in the day. I do not think you will ever want to rear them as late as that. With all weak colonies I like to have the entrance away from the combs; they are not so apt to rob. Take a full big hive, and in making a nuclei you put the entrance away over on the other side as far as you can get it. About two queens a month is all we calculate to get out of a nucleus. They may hatch and be looking all right, and you may think you are going to have them, and about the thirteenth day you go around and look at them, because we wait for thirteen days, and then they are larvæ. By having larger nuclei they will maintain themselves. Sometimes if you take the queen away before the eggs are all hatched, they will destroy every egg and won't have any brood at all. In the fall we take four nuclei and we go along and remove this or that queen. As soon as these have been queenless three days you remove that button and they will gradually work through, and you never see any fighting among the bees.

I want to show you how you can re-queen every year and still not stop the workings of your hive and be at any extra trouble. About the middle of the honey flow, or just after it is over, it doesn't make any difference, I go along, and I have ripe cells. I go to my colony, and I take a frame of brood out of the centre. It has got to be just hatching. I insert the ripe queen cell in it. I take this zinc division board with a hole in it, and slip it down near the end of the hive. There is an entrance to the hive on the back. The bees are hatching out, and it is warm weather, and you have no trouble of the cell chilling or anything of that kind, and there you have a self-made nucleus and have not disturbed your hive at all.

Mr. Miller: That includes simply one frame behind that?

Mr. Clark: Yes. You can make it from two frames if you like.

Mr. Holtermann: You put that cell in immediately you make the division?

Mr. Clark: Yes.

Mr. Sibbald: That cell will have a protector on it?

Mr. Clark: Always put a protector on. You can go and look at that cell and see whether it is hatched or not, whereas, if you put it in on the comb and did not look at it for two or three days, it might have hatched, and they will destroy the cell and take it away; and it saves you the trouble of looking all through that colony to see whether you have got a virgin or not.

Another plan I have used. I have as many hives without bees in as I have with. You can place a nucleus with a frame or two in it right beside the hive any season you like, and let that queen work along and she will get quite a colony of bees, and when the time comes forward I want to re-queen, I kill the old queen and let the new queen go in. That necessitates an extra hive which you would not feel like having perhaps.

I like to re-queen every year. A pullet is better than an old hen.

One point I wanted to bring out, and that was about so many inferior queens being received, and they wonder if the queen breeder is not to blame. My theory is that queen breeders will go to the comb and take a laying queen; she is full of eggs, right in the height of her egg production; they will take her and put her in the cage with bees, and put her in the mail as soon as they can get her in; there she is loaded with eggs, and by the time she reaches her destination she is about ready to give up anyway, if she is not dead. Generally we take the queen and cage her the day before and leave her over night, and by morning she is reduced a third.

Just as the white honey flow is winding up we go to the colonies that we want to rear drones from. I have drone combs, and I insert them right in the centre, and in nine cases out of ten the queen lays in there all right. That is along about the first part of August. Then I leave it there till the most of it is sealed over, then take full colonies, as many as I want to prepare for queen rearing, and make them queenless, and put that brood in there and they will not destroy it as long as they have not got a queen. Let them rear a queen themselves, and as soon as she is hatched and raised, take her out. Then you have your own selection in the fall. In fact, you almost control mating in the fall in that way.

A committee of Messrs. Sibbald, Byer and Timbers, was appointed with instructions to ascertain the correct dimensions of a pail to hold either 5 lbs. or 10 lbs. net and gross.

ANNUAL REPORT

OF THE

Bureau of Industries

FOR THE

Province of Ontario

1909

PART I.—AGRICULTURAL STATISTICS.
PART II.—CHATTEL MORTGAGES.

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., *etc., etc., etc.*
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present herewith for the consideration of Your Honour the Report of The Ontario Bureau of Industries for 1909.

Respectfully submitted.

JAMES S. DUFF,
Minister of Agriculture.

TORONTO, 1910.

CONTENTS

PART I.—AGRICULTURAL STATISTICS.

PAGE.

THE WEATHER: General review showing the monthly *temperature*, *sunshine*, and *rainfall* for the five years 1905-9 7

VEGETATION: Spring Seeding 9

STATISTICS OF FIELD CROPS 10

THE GRAIN CROPS: General description as to condition and harvest.
- Fall wheat 10
- Spring wheat 12
- Barley 12
- Oats 12
- Peas 13
- Beans 13
- Rye 13
- Buckwheat 13
- Corn 14
- Mixed grains 14

HAY AND CLOVER: General description 14
- Clover seed 15
- Alfalfa 15

FIELD ROOTS: General description.
- Potatoes 15
- Turnips 16
- Mangels 16
- Carrots 16
- Sugar Beets 16

MISCELLANEOUS:
- Tobacco 17
- Flax 17
- Threshing and Marketing 17
- Fall Plowing 17
- Farm Improvements 17

FRUIT AND FRUIT TREES: General description 18

LIVE STOCK AND THE DAIRY: General review as to condition.
- Live Stock 19
- The Dairy 20
- Fodder Supplies 20
- Poultry 21
- Statistics 21

LABOR AND WAGES: General condition 22

STATISTICS OF THE WEATHER: Showing details by months and stations or districts.
- Temperature, 1909 23
- Temperature, 1882-1909 24
- Rain or Snow 25, 26
- Sunshine 26

PAGE.

RURAL AREA ASSESSED: Showing by counties as taken by municipal assessor for 1909, the total *area*, acres *cleared*, acres in *woodland*, acres in *slashland*, and acres in *swamp*, *marsh* or *waste lands*; also totals for the Province for the five years 1905-9 27

STATISTICS OF FIELD CROPS: Showing by counties the area, produce and market values for the year 1909, together with totals for the Province for the past five years, the average for the five years 1905-9, and for the twenty-eight years 1882-1909; also the average yield per acre.

Fall wheat 28
Spring wheat 28
Barley 29
Oats 29
Peas 30
Beans 30
Rye 31
Buckwheat 31
Corn 32
Potatoes 33
Carrots 33
Mangel-wurzels 34
Turnips 34
Sugar beets 35
Hay and clover 35
All field crops as above 36
Orchard, small fruits and vineyard 36
Pasture 37
Mixed grains 37

RATIOS OF AREAS UNDER EACH CROP IN 1909 PER 1,000 ACRES OF CLEARED LAND 38

MARKET PRICES: Showing by counties the average market prices of agricultural products for 1909, with comparative market prices for the Province for the past five years and the averages for the twenty-eight years' period 39

STATISTICS OF LIVE STOCK: Showing by counties the number and value of stock on hand July 1, 1909, together with the number and value of those sold or slaughtered during the year ending June 30, 1909; also comparative totals for the Province for five years.

Horses 40
Cattle 40, 41
Sheep 42
Swine 42
Poultry 43

WOOL: Showing by counties the clip of 1909 44

BEES: Showing by counties the number of colonies and value (including outfit) 44

VALUES OF FARM PROPERTY: Showing by counties the value of *farm land*, *farm buildings*, *implements* and *live stock* 45
Farm property values per acre occupied 46
Value of buildings, implements and live stock per acre cleared 46

PART II.—CHATTEL MORTGAGES.

CHATTEL MORTGAGES ON RECORD: Showing by counties the number and amount of chattel mortgages on record and undischarged on December 31, 1909, against (1) all occupations; (2) farmers; also totals for the Province for five years 47

Ontario Bureau of Industries.

PART I.—AGRICULTURAL STATISTICS.

THE WEATHER.

Under their respective headings, summary tables of temperature, precipitation, and sunshine are herewith presented:

TEMPERATURE. The following table gives the temperature of the Province in each month for the last five years, together with the mean annual temperature, also the mean temperature for the six months April-September—practically the growing season—together with the average for the five years, 1905-9, and the twenty-eight years, 1882-1909:

Month.	1909	1908	1907	1906	1905	1905–1909	1882–1909
	°	°	°	°	°		°
January	21.6	18.7	16.9	26.6	13.6	19.4	17.6
February	22.1	14.8	13.1	18.4	12.7	16.2	17.4
March	26.9	28.1	31.0	23.4	27.2	27.3	26.7
April	38.6	39.9	36.4	43.3	41.1	39.8	41.3
May	52.0	55.8	47.3	53.5	52.7	52.3	53.6
June	64.2	64.9	63.2	65.0	62.8	64.0	63.5
July	66.6	69.4	67.3	68.2	68.7	68.0	67.9
August	67.0	65.4	63.7	70.0	66.1	66.4	64.8
September	57.9	63.0	59.5	63.3	60.9	60.9	58.9
October	44.8	49.4	44.1	47.6	47.5	46.7	46.3
November	39.0	36.9	34.3	35.0	33.7	35.8	35.1
December	22.9	23.4	26.5	19.9	27.0	23.9	23.6
Annual mean	43.6	44.1	41.9	44.5	42.8	43.4	43.1
Mean for 6 months, April to September	57.7	59.7	56.2	60.5	58.7	58.6	58.3

The mean temperature for the year 1909 was 43.6 degrees, being 0.5 degrees lower than that of the preceding year, and 0.5 degrees higher than the mean temperature for the twenty-eight years.

The mean temperature for the six months April-September was also lower by 2.0 degrees than the same period of the preceding year, but only 0.6 degrees less the twenty-eight year normal. February was the warmest month relatively, being 4.7 degrees above its normal, while April was the coldest relatively, with 2.7 degrees below its average.

Sunshine. In the following table the averages of sunshine are, as usual, derived from the records of the weather stations at Woodstock, Toronto, Lindsay, Kingston and Ottawa:

Month.	Sun above horizon.	1909	1908	1907	1906	1905	1905–1909	1882–1909
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
January	285.7	67.1	92.3	65.5	88.6	80.6	78.8	74.0
February	291.4	76.6	120.9	116.6	135.4	116.1	113.1	103.2
March	369.9	141.7	95.2	127.1	133.0	157.7	131.0	141.6
April	406.4	156.7	177.3	155.9	201.6	169.8	172.3	185.9
May	461.1	191.5	188.2	219.9	218.6	206.5	205.0	215.9
June	465.7	264.3	332.9	230.8	228.8	210.4	253.4	245.4
July	470.9	266.0	295.4	265.7	270.3	236.8	266.8	265.4
August	434.5	273.4	263.3	252.2	255.7	261.6	261.2	244.0
September	376.3	182.4	177.0	129.6	237.7	194.6	184.3	187.0
October	340.2	128.1	162.3	153.9	125.7	151.8	144.4	139.7
November	286.9	95.5	72.1	63.0	84.2	95.9	82.1	78.7
December	274.3	55.9	61.6	46.8	65.6	63.8	58.7	59.9
Total for the year	4463.3	1899.2	2038.5	1827.0	2045.2	1945.6	1951.1	1940.7
Total for six months, April to September.	2614.9	1334.3	1434.1	1254.1	1412.7	1279.7	1343.0	1343.6

The year 1909 had 1,899.2 hours of sunshine, or 41.5 hours less than the average for the last twenty-eight years. The six growing months, April-September, had 1,334.3 hours of sunshine, or 9.3 hours less than the period, 1882-1909. The five months—March, June, July, August and November—were average or above; August being the highest with 29.4 hours; all the others were below, ranging from 4.0 hours in December to 29.2 hours in April.

Precipitation. The fall of both rain and snow for the five winter months, including November, 1908, and March, 1909, is given in the following table for five years, together with the average, for the five years, 1905-9, and for the twenty-eight years, 1882-1909. An inch of water is the equivalent of ten inches of snow:

Months.	1909	1908	1907	1906	1905	1905–1909	1882–1909
November:	in.	in.	in.	in.	in.	in.	in.
Rain	1.25	2.64	2.01	1.96	.33	1.64	1.97
Snow	6.3	4.3	2.8	6.0	4.3	4.7	7.5
December:							
Rain	.48	1.95	1.69	1.22	.55	1.18	1.27
Snow	19.6	18.3	12.2	8.8	14.6	14.7	15.2
January:							
Rain	1.29	.45	1.92	1.34	.22	1.04	.97
Snow	11.5	20.6	11.5	10.2	23.2	15.4	19.5
February:							
Rain	1.52	.82	.09	.46	.06	.59	.89
Snow	16.2	27.7	10.5	7.1	20.5	16.4	16.3
March:							
Rain	1.06	1.36	1.62	1.13	.98	1.23	1.22
Snow	16.8	7.4	5.1	11.6	3.6	8.9	10.6
Five months:							
Rain	5.60	7.22	7.33	6.11	2.14	5.68	6.32
Snow	70.4	78.3	42.1	43.7	66.2	60.1	69.1

The total amount of rainfall for the five months, November-March, was 5.60 inches, or 0.72 inches above the average for the same period for the twenty-eight years, 1882-1909.

The total amount of snowfall was 70.4 inches, or 1.3 inches above the average for the twenty-eight year period. January was 8 inches below its normal, while March was 5.9 inches above.

The six months, April to September, however, comprises what is regarded as the growing season for most crops, and the following table give the rainfall of these months for the last five years, and also the average for the five years, 1905-9, and for the twenty-eight years, 1882-1909:

Months.	1909	1908	1907	1906	1905	1905–1909	1882–1909
	in.	in.	in.	in.	in.	in.	in.
April	3.48	1.59	1.78	1.41	1.04	1.86	1.68
May	3.44	3.59	1.77	2.34	3.32	2.89	2.85
June	1.36	1.83	2.26	4.52	3.53	2.70	2.85
July	4.02	2.90	2.17	2.93	3,55	3.11	2.95
August	2.18	2.36	1.31	2.57	3.26	2.34	2.55
September	1.91	1.13	3.76	2.41	2.42	2.33	2.59
Total for six months	16.39	13.40	13.05	16.18	17.12	15.23	15.47

The rainfall for the six months, April-September, comprising the growing season, was 16.39 inches, or 2.99 inches more than 1908, and when compared with the twenty-eight year period, it is 0.92 inches in excess. April, May and July were greatly in excess of their respective normal, while June, August and September were considerably below.

VEGETATION.

In the opinion of many correspondents the growing season of 1909 was the latest for at least a score of years, it being placed at from one to two weeks later than the average. The exceedingly wet and cool weather prevailing during April and the early part of May is the cause. Returns were made to the Department as to the prospects about the middle of May, and at that date more favorable weather conditions had given a fresh impulse to growth in both field and forest. Up to that time only the earlier varieties of trees were coming into leaf, and in most localities pastures were only beginning to permit of live stock being turned upon them.

Spring Seeding. The small portion of the spring crops that was put in early found an excellent seed bed, but heavy rains immediately followed, and the land got too soft to work on, making further sowing almost an impossibility for weeks, except in a few cases where, to use the expressive language of some correspondents, the seed was "puddled" in. While those on high, light, or well-drained land have made fair headway with their spring seeding, the bulk of farmers were not more than half way through with that work in the second week of May—a most unusual record for Ontario. However, farmers were eager to get on the land with the first appearance of dry weather, and while some correspondents were taking a rather gloomy view of the situation others were most hopeful that with the advent of warm weather there would be a quick advance in the growth of spring crops.

A special bulletin regarding spring crops was issued later, describing conditions prevailing up to the 22nd of June. It said: "April was an unusually wet and cold month, and early sowing was hindered. The first half of May was also unfavorable to farm operations, and as a consequence spring sowing was very backward at the end of that month. However, a general rainfall about the 17th of June, followed by warm weather, sent growth along with a bound, and spring crops were fast approaching normal conditions when returns were made."

STATISTICS OF FIELD CROPS.

The following table gives the acreage, production and market value of the field crops of Ontario for the year 1909. Detailed tables showing the statistics by counties will be found elsewhere in this report:

Crops.	Acres.	Bushels.	Bushels per acre.	Market Value.
				$
Fall Wheat	663,375	15,967,653	24.1	16,335,950
Spring Wheat	135,161	2,223,567	16.5	2,237,189
Barley	695,262	18,776,777	27.0	10,286,328
Oats	2,695,585	90,235,579	33.5	35,612,676
Peas	381,609	7,613,656	20.0	6,437,685
Beans	45,029	826,344	18.4	1,334,325
Rye	94,661	1,573,921	16.6	1,060,566
Buckwheat	176,630	4,280,790	24.2	2,284,440
Corn (for husking)	322,789	22,619,690	70.1	9,705,826
Potatoes	169,695	24,645,283	145.	8,989,452
Carrots	3,506	1,001,653	286.	125,207
Mangel-wurzels	70,488	28,928,347	410.	2,314,267
Turnips	113,400	50,738,940	447.	5,073,894
Sugar Beets	19,812	7,001,565	353.	840,188
Mixed grains	474,530	16,199,434	34.1	8,825,196
		tons	tons	
Corn (for Silo)	288,346	3,374,655	11.70	6,749,310
Hay and Clover	3,228,445	3,885,145	1.20	49,754,078
Totals:				
1909	9,578,323			167,966,577
1908	9,621,683			164,077,282

The acreages devoted to other crops were as follows: Orchards, 300,364; small fruits, 24,614; vineyards, 11,420; gardens, 57,123; rape, 37,548; flax, 11,253 (Huron, 2,692); hops, 855; tobacco, 4,101 (Essex, 3,208); summer fallow, 231,707; pasture (cleared) 3,180,780.

THE GRAIN CROPS.

Fall Wheat. The bulletin issued in November, 1908, thus referred to the fall wheat then about to enter the winter: "While some correspondents report an average or an increased acreage of new fall wheat in their respective localities, a larger number of returns show a decided shrinkage in area, ranging from 10 to 25 per cent. This decline in acreage is attributed mainly to unusually dry fall weather, which caused many farmers to delay putting in all the wheat they had planned for until it was too late. Sowing ranged from the 25th of August till the middle of October. Some of the seed sown in August did not germinate until late September or early October rains fell, and many 'patchy' fields are reported. Summer fallows as a rule made a fair catch, and came along nicely; but fall wheat sown on stubble land was very dry, and growth was unusually backward. Much of the young wheat had so little top that fears were expressed of its successfully tiding over the winter. Scattered reports have been received of injury from the Hessian fly, but the situation in this respect is a marked improvement upon that of the last three or four years. Some forty-five varieties of fall wheat are named as being grown, Dawson's Golden Chaff still being the favorite."

Reports concerning the prospects of fall wheat, received about the middle of the following May (1909), varied greatly, even in the same localities, some describing the crop as looking well, though late, while others stated that the fields were not only backward in growth, but were thin and much "spotted." Owing to the dry period prevailing when most of the seeding was done, much of the new fall wheat did not start until the rains of late September came, and the young plants entered the winter with very little top. Winter conditions, however, were not unfavorable to the crop, except where ice formed, and an early spring growth would have brought the fields along nicely; but the cold and very wet weather of April retarded growth, and on poorly drained or low land almost drowned out the crop. The May bulletin went on to say: "Much better growth was made on sandy and gravelly soils than on clays, owing to the excessive moisture. While there are many patchy places, plowing up of the crop will not be generally resorted to, owing to grass being seeded with the wheat, but barley or other spring grains will be drilled into the bare spots. The latest reports are the most favorable, showing that the crop is rapidly recuperating with the growing weather. There is less injury than usually reported from insects."

As correspondents wrote on or about the 22nd of June, fall wheat was heading out, being about a week or ten days later than usual. While some correspondents spoke of the likelihood of a large yield, fully as many described the fields as being thin or spotted on low-lying or undrained soils. A considerable area had been plowed up, and more would have been but for the wet condition of the ground, and the fact that grass had been sown with the wheat. Many of the patchy spots were resown with barley or oats. Taken on the whole, the June prospects for fall wheat were decidedly better than those of May.

According to the August bulletin, fall wheat turned out much better than was expected earlier in the season, the yield for the Province being well above the average, and the weight and general quality of the kernel being fully up to the standard. "Here and there poor returns have been reported, sometimes running as low as 10 bushels an acre; but on the other hand large yields are more common, in some instances going as high as 40 bushels to the acre. The weather was all that could be desired for harvesting. The straw, while rather short, is bright and clean, reports of rust being only occasional. Several correspondents speak of summer-fallowing as having this season proved to be of great advantage to fall wheat growing. The Hessian fly did not do any serious injury, but its presence was noted in Lincoln, Welland, Huron, and most of the counties in the Georgian Bay and West Midland districts. The crop suffered but little from any other insect pests. Harvesting began about the middle of July and extended over three weeks, according to locality."

November reports were to the following effect: While a few correspondents claimed that the grain did not turn out as well as was expected from the stand, the great majority of those reporting regarded fall wheat as an extra good crop, the yield being large and the grain in most cases well up to or above the average. The straw, like that of all the cereals this season, was short, but bright, and of good quality.

THE NEW FALL WHEAT. The November bulletin contained the following reference to the crop of fall wheat then in the ground: "The high prices which have been prevailing for wheat have resulted in a considerably enlarged area of that grain being sown this fall. The ground was rather dry and lumpy at seeding, especially on stubble land, with the weather rather cool, and as a consequence the catch was a little slower than usual. The result is that the young plants are rather shorter on top than in most seasons at this time, but are otherwise vigorous and of good color, and most fields will enter the winter with good prospects. Sowing ranged from the last week of August to the end of September, but most of the crop was got in about the second week of the last-named month. Only a few references to the Hessian fly were made by correspondents this year; white grubs and wire-worms are the chief insects complained of. Dawson's Golden Chaff is still the favorite variety."

SPRING WHEAT. The crop bulletin issued in the latter part of June stated that there had been a further decline in the acreage of spring wheat, but that where grown it was looking well, considering the late sowing.

The August bulletin said: "There is a smaller acreage of spring wheat reported than ever before, more especially in Western Ontario. The crop was only about half cut when correspondents wrote, but it was estimated that the yield will be fully an average. The grain, as in the case of fall wheat, is described as being a good sample, and the straw as short and thin, but clean and bright."

Spring wheat was described in the November reports as being from fair to good in both yield and quality, although correspondents had less than usual to say about the crop.

BARLEY. It was estimated in the June bulletin that about an average acreage had been given to barley. It had a backward start, but when correspondents wrote late in the month it had made a splendid growth, and there was a prospect of a good yield should favorable weather continue.

August returns were thus summarized: "As in the case of the wheats, barley is characterized as being short in the straw but plump in the grain, and in both as being of good color. While many large yields are reported, the average for the Province will fall short of that for the last twenty-seven years by nearly a bushel and a half per acre, the late, wet spring and the drouth of June being given as the causes. According to some correspondents, the very hot weather of midsummer caused some premature ripening. Cutting ranged from the last week of July to the middle of August."

According to the November reports, the yield of barley was variable, and, taking the Province over, was a little below an average. The weight of the grain also ranged from light to plump, but the color was all that could be desired.

OATS. June returns concerning oats were to the effect that as a whole the crop looked well, although rather thin in places.

The August bulletin contained the following: "Considering the poor seed-bed and other drawbacks of the season, oats will be a fair crop, although they will fail to reach an average yield per acre by at least three bushels. The crop is a most uneven one this season, yields running all the way from 5 to 60 bushels an acre. The sowing time was much broken up on account of the wet spring, and as a consequence the harvesting period is extending all through the present month. The grain is said to be of good quality generally, although the intense heat of the first week of August caused some premature ripening. The plants did not stool out as well as usual, and the straw is rather thin and short, and there are reports from several districts of there being a slight rust. Grasshoppers were reported as doing more or less injury to the oat fields in some of the Lake Huron, Georgian Bay, and St. Lawrence and Ottawa counties, and in the Northern districts."

The condition of oats was thus summed up in the November bulletin: "This crop may be described as being in most cases rather light in yield per acre, and also light in weight per measured bushel, although a few correspondents send more favorable reports. The midsummer drouth was given as the cause of the shrinkage. Slight mention was made of rust and smut. Oats have a larger area than all the other grain crops put together."

Peas. The lateness of the season prevented the sowing of some cereals, and led to a larger acreage being given to peas. The June bulletin regarded the crop as looking promising and less was said about the "bug" or weevil than for years.

The August bulletin said of peas: "This crop will be one of the best of the year, but there are some complaints of it ripening unevenly in the field. As in the case of the cereal crops there is a great variation of yields reported. Generally speaking, peas have withstood the effects of the dry midsummer remarkably well, and will have more straw, relatively, than the grain crops. About half of the harvesting of peas remained to be done as correspondents reported. The crop appears to be freer than usual from what is known as the pea weevil or 'bug,' but complaints are made for the second time of the presence of an aphis or small louse on the plants in the Lake Ontario and East Midland districts."

The opinions of correspondents in November were much divided as to peas, reports concerning the crops running from "poor" to "very good." The weevil was reported to be still in evidence, more especially in the western counties, but not to such an extent as has been complained of in the last two or three years.

Beans. Like other field crops, beans this year were planted late. They came up nicely, however, and were looking well when correspondents reported about the 22nd of June.

The August bulletin thus described the condition of beans: "This crop is later than usual, and harvesting was not expected before the first week of September. The pods are likely to be better filled than in the two years immediately preceding, and will therefore give a yield considerably above the average. A few complaints are made of rust."

November returns were thus summarized: "From fair to good, both as regards yield and quality, covers the remarks describing beans. The crop suffered chiefly from the drouth in midsummer."

Rye. Rye sown in the fall came through the winter well, and was looking better than the fall wheat. The acreage given to this crop, however, is comparatively small and very much scattered, more of it being raised to help out with pasture than for the grain.

August reports considered the condition and yield of the crop to be fully up to the ordinary.

According to the November bulletin, rye did well where grown.

Buckwheat. The special crop bulletin issued in the latter part of June said: "Buckwheat is being planted more largely than ever this year in nearly every part of the Province, mainly as an emergency crop, owing to some other grains being crowded out by the lateness of the spring."

"A greatly-increased acreage has been given to buckwheat this year," said the November bulletin, "owing to the wet, cold spring being adverse to the sowing of the more standard grains. Although frost caught some of the late buckwheat, the crop generally is considered to be one of the best for years in both yield and quality. In short, 1909 will be remembered in Ontario as the buckwheat year.

CORN. The June bulletin observed: "Ontario farmers appear to be depending more upon corn than formerly. The area has been considerably enlarged this year, and the only drawback to the situation is the lateness of planting; in fact, some were putting in corn in the third week of June. What was up when correspondents wrote looked well, although even then some complaints were being made of the grub."

August reports were full in their references to the outlook for corn. The bulletin published in that month said: "A decidedly larger acreage and an unusually large planting are the outstanding features of the corn crop. The cold and wet spring not only delayed the getting in of the seed, but it prevented the land from being in the best condition for corn. In addition to this, crows and blackbirds in large numbers attacked the fields in their early stages, while in other sections the white grub wrought injury. Despite all these drawbacks the crop rallied in a wonderful manner, and the majority of reports are decidedly favorable as regards silage and fodder corn should the fall prove to be a reasonably warm and open one. Those growing corn for husking are not so hopeful, as the earing has not been generally good."

The returns relating to corn made in November were to the following effect: "Notwithstanding the backward spring and the consequent lateness of planting, corn has turned out well, especially in the eastern half of the Province, where it is grown chiefly for the silo. In some of the western counties the crop was slightly nipped by frost, and there are some complaints of softness; but so much well-matured corn has been handled that the general report for the Province may be classed as favorable."

MIXED GRAINS. The growing of mixed grains appears to be gaining in favor, although some correspondents object to the practice. The favorite combination is late barley and early oats; next come peas and oats, then barley, oats and peas. Oats, peas and wheat, and barley, peas and wheat also figure as mixtures. Buckwheat and flax are added to some of the grains already mentioned. Several correspondents assert that by the growing of mixed grains a larger yield is taken off the ground than if the crops were grown singly. It is also claimed that peas mixed with oats or barley favorably shade the roots of the cereals, and also that the peas in the combination can be cut with the binder.

HAY AND CLOVER.

CLOVER. The May bulletin had the following to say regarding the outlook for clover: "Old meadows poor, new meadows promising, is a fair summary of the returns regarding this crop. Early reports spoke of considerable heaving, but later returns state that much of the loose sod is returning to place. Clover was injured by the long dry spell covering the latter part of last summer and early fall, and in many instances it was pastured too closely owing to the scarcity of fodder. The unusually cold spring, with frequent rains, also hurt the crop, particularly on low or badly-drained land. Like fall wheat, clover looks best on high land and on light soils. While many correspondents predict a good yield of hay, others are looking for a comparatively light cut."

June prospects were summed up as follows in the special bulletin issued in the latter part of that month: "Hay, like fall wheat, will be very variable in yield, ranging from light to heavy even in the same localities, but the present outlook for the crop is more favorable than that reported a month ago. New meadows have done much better than old ones, and clover is reported to be relatively ahead of timothy. There has been practically no complaint of the midge. The poorest accounts concerning hay come from the St. Lawrence and Ottawa counties and the Northern districts. Cutting will be fully a week later than usual. Reports regarding alfalfa are practically unanimous as to the vigorous growth of that crop."

Hay and clover were thus dealt with in the August bulletin: "The redeeming feature of the hay crop is its excellent quality. The main portion of the cut was harvested under the most favorable conditions, and the almost perfect curing of the hay will make it go much farther than if of only average quality. The average yield per acre will be small, disappointingly so in the eastern portion of the Province. June proved to be too dry and hot for full growth, old meadows especially being short. Grasshoppers also did considerable harm to the crop in several counties, both east and west. The second growth of clover, however, promises well for seed. Lucerne did much better than clover or timothy, as it appeared to be less affected by the drouth."

CLOVER SEED. The summer was too dry for the best results in clover seed, and added to this is the fact that the regular pastures were so closely cropped that in many cases cattle had to be turned in on some of the fields reserved for seed. The general quality of the seed that was saved ranks high.

ALFALFA. The acreage given to alfalfa is steadily increasing. The bulk of the reports received favor it as a hay crop, as it does well on high clay soils where clover is more or less of a failure. The chief complaint made against alfalfa by correspondents is that it will not stand close cropping as a pasture crop, more especially in the fall.

FIELD ROOTS.

POTATOES. The special bulletin issued in the latter part of June contained the following: "Very few early potatoes were got in, but late planting had been vigorously pushed, and in a number of counties the acreage will be greater than last year. The season being a week or two later than usual, the vines were not of average size when returns were made, but the outlook generally was favorable, although the bug was beginning to appear in large numbers."

The August bulletin said: "Late-planted potatoes have done better than those put in earlier, and the crop appears to be more promising in the eastern half of the Province than in the west. The bug was present in large numbers, and in some instances got in its work ahead of its treatment. Hardly any mention has been made of blight, and none of rot. With ordinarily good weather for the next few weeks the yield of potatoes ought to be one of the best in recent years."

The following interesting statement appeared in the November bulletin: "Notwithstanding that the crop has suffered from drought in some quarters, the general trend of returns indicates an unusually big yield of large, smooth, sound-looking potatoes. The best reports concerning the crop come from the St. Lawrence and Ottawa counties. The only mention of rot came from a correspondent in the Rainy River district. One peculiar feature of the season in connection with the potato crop is the manner in which the tubers have been attacked by white grubs, which have been identified by Dr. Bethune, Professor of Entomology at the Ontario Agricultural College, as the larvæ of what are familiarly known as May beetles or June bugs. This year these grubs have not confined their attention to the stalks, but in some instances have also attacked the potatoes, boring into some and rendering them unfit for market.

Prof. Bethune writes as follows regarding this pest:

> "White grubs are the larvæ of what are familiarly known as May beetles or June bugs. They breed for the most part in old pastures and require three years to attain to maturity. Crops that are planted when an infested field has been broken up are usually attacked by these grubs. During the first year they feed to some extent upon the remains of the sod that has been turned under, but during the second year, there being nothing else, they attack the roots of whatever crop there may be, and are especially injurious to corn, strawberries, potatoes, etc. During the latter part of this season complaints were sent in from a number of counties telling of injuries to potatoes; many of the samples received were bored through and through by these grubs. The best remedy for them is a short rotation of crops, so that there will be no time allowed for their attaining maturity. An infested field may be fairly cleared of them by permitting hogs to roam about, they will root the grubs up and eagerly devour them. Late plowing is desirable in order to break up their winter quarters and expose them to the weather and their various enemies. Working underground as they do, it is not practicable to apply any poisonous remedies. Dependence must be placed upon the methods referred to."

TURNIPS. All classes of roots were described as being backward in growth when correspondents reported for the June bulletin in the third week of that month. In many cases there was little beyond the first showing of the plants above ground. Turnips were promising well, although many fields had been held back purposely in order to escape the louse.

According to August reports turnips are this year better than mangels, a reversal in the order of the last few years.

The November bulletin had the following to say of turnips: "Reports regarding these roots are variable, ranging from fair to good, but the average yield will be well above the ordinary. They were making good growth late in the season, and on that account some had not yet been pulled when correspondents wrote, although the bulk of the crop had been housed. Some complaints were made of the louse or aphis, but not to so great an extent as in the last two or three years."

MANGELS. When the first returns were made, late in June, mangels were said to be not doing well, being backward in growth, and some patchy places had to be sown with turnips.

The August reports were to the effect that mangels would be relatively an inferior crop to turnips for the first time in many years.

The November bulletin had a similar statement to make. It said of mangels: "These roots have not done so well as turnips, although some individual reports are favorable. Most of the crop had been put under cover as correspondents wrote."

CARROTS. Returns relating to carrots are so meagre in description that practically nothing can be said of their condition as a field crop.

SUGAR BEETS. June reports regarding sugar beets were that where grown the crop was looking well.

"A fair field of rather small beets of good quality," summarizes the November returns relating to sugar beets.

MISCELLANEOUS.

TOBACCO. Owing to the land being so wet, tobacco was not planted until a week or two later than usual. The plants were rather small when returns were made on the 22nd of June, and there were reports of the crop being attacked by grubs.

The August bulletin said: "Too much rain in the early part of the season and too little later on is the general complaint of tobacco growers. The spring was wet and raw, and the plants were got in late, and as a consequence maturing will be considerably delayed. Grubs attacked the young fields, and considerable extra planting was necessitated. Even with most favorable weather to come only a moderate yield is looked for."

The following reference to tobacco was made in the November bulletin: "This crop is only medium in yield, but the leaf is of good quality. Some plants were touched by the frost, but most of the crop was well harvested, and is curing nicely."

FLAX. Flax is not grown generally. Late sowing was the chief drawback. Pulling began in the first week of August, and the crop was then described by correspondents as being from fair to good.

THE SOW THISTLE. Among the remarks of correspondents quoted in the November bulletin were a number of observations upon the danger to agriculture in Ontario from the spread of the Sow Thistle. The remarkable agreement of opinion as to the serious danger threatening field culture from this weed pest is worth heeding, as the correspondents quoted are among the most thoughtful and experienced farmers in the Province.

THRESHING AND MARKETING. The November bulletin said: "Threshing was well advanced as correspondents wrote; in fact, it was finished in most cases. A dollar a bushel for wheat was coaxing a moderate quantity of that grain into the market, and some are evidently holding back for even better prices; but a majority are keeping the bulk of their wheat, barley, oats and other grains to feed to live stock, as they claim that it pays them as well in cash, and also keeps up the fertility of the soil. The high price of mill feeds is also leading to the use of more grain in feeding live stock. Another thing preventing early marketing of grain is the fact that most farmers are busy fall plowing and root harvesting, and they seem to have sufficient confidence in the grain market to let sales wait until a more convenient season."

FALL PLOWING. The following describes the progress of plowing up to the 4th of November, as given in the bulletin issued in that month: "The late harvesting delayed plowing, and the dry midsummer made some clay soils so hard to break up that plowing was rather backward in many localities as correspondents wrote. On loamy land, however, good progress has been made, and timely rains were putting most fields into good condition for plowing. Judging by the returns, it is probable that a larger area than usual will be plowed this fall should the season remain open. Double-furrowed and other improved plows are being used to advantage, and are making up for lack of good farm help."

FARM IMPROVEMENTS. The following appeared in the November bulletin: "The backward spring put harvesting late, and crowded farm operations generally; consequently only moderate progress was made in underdraining. There was a fair amount of fencing done, in nearly every case of some design of wire. A good many barns have been built, or old ones have been remodelled by having concrete base-ments built under them. A number of substantial farm dwellings have also been erected. Metallic roofing and siding is becoming more popular for farm buildings. More improvements would have been made but for the scarcity and high price of skilled labor."

FRUIT AND FRUIT TREES.

Orchard conditions were thus dealt with in the May bulletin: "All classes of fruit trees have come through the winter in good shape so far as injury from the weather or mice is concerned, although bark-splitting is reported in some northern localities. Unfortunately there are a number of references to the presence of San Jose scale and the oyster-shell bark-louse, and it is very evident that a steady warfare must be waged against these and other insect pests if our fruit trees are to thrive. Several correspondents declare that too many of our orchards are still badly neglected. While leafing and blossoming were about a week or two backward, reports were to the effect that, barring late frosts and heavy rains at the time of bloom, a good yield of fruit may be expected. Peaches, especially, are looked to for a large yield, as the buds were but little injured by the winter."

The special crop bulletin based upon information reported on the 22nd of June said: "Fruit blossoming was late but full, and there has been a more general setting of fruit than in ordinary years. Apples will likely turn out satisfactorily, for although early varieties will be scarce, the more valuable winter sorts promise a big yield. Pears will be only fair. The latest reports regarding peaches put the probable yield as medium; in some places the trees have been attacked by curl leaf. Plums are likely to be a full crop, taking the Province as a whole; although in some of the St. Lawrence and Ottawa counties a number of trees are said to have been 'blasted.' Cherries will yield from fair to large crops. Grapes promise an average yield, and small fruits generally will do well unless drouth sets in early."

The August bulletin has the following regarding fruit: "Early apples are much scarcer than usual, but there is a good promise of the winter sorts, which are most in demand for export. A number of complaints are made that some of the fruit is dropping from the trees owing to drouth, and also that many apples are small in size. The codling moth has been rather common this season, and there will likely be a full share of wormy fruit where not sprayed; but so far apples are said to be remarkably free from spot and other fungus attacks. Pears are described as being from light to good in yield. Plums are variable in yield, those who sprayed at the proper time getting excellent results. The curculio did much injury to plums where no spraying was done, and odd reports of rot have also come in. While some full yields of peaches are reported, the entire crop will be only a medium one. Cherries were plentiful this year, and of unusually fine quality. Grapes again give promise of a large return, and so far as regularity of yield is concerned are now regarded as one of our most consistent fruit crops. Small fruits of all kinds did well, and but for the drouth prevailing at the time of ripening and picking would have given record yields."

The following reference to fruit was made in the November bulletin: "Taking all classes of fruit together, the year has been a fairly good one. The yield of winter apples has been up to the average, especially in the cases of the Baldwin and Spy, but earlier and less valuable varieties were rather scarce. There are some complaints of apples being small in size, and heavy winds in October shook off a lot of the fruit, but the tent caterpillar has done less injury than usual to apple trees. On the other hand, apples have been remarkably well colored this season. Other orchard fruits did well, there being a surplus of most kinds, more particularly cherries, plums, grapes and small fruits. The oyster-shell bark-louse is the insect most frequently complained of this season, and next to that the codling moth. It is also said that the vitality of many old apple trees has been affected by the drouth."

LIVE STOCK AND THE DAIRY.

LIVE STOCK. The May bulletin said: "The general condition of live stock may be briefly described as thin but thrifty. No disease of a serious or epidemic nature has appeared, the mild forms of strangles and distemper among horses reported in several parts of the Province being of a local nature. Horses are said to be good in heart, although not looking so plump or sleek as in some years, owing to close feeding. The same may be said of both beef and dairy cattle. The chief ailments reported amongst this class of stock were cases of abortion and other parturient troubles with a number of cows, and scours in calves. Most of the stall-fed and other fat cattle have been disposed of, and the number of stockers going upon grass is somewhat less than in former years. Sheep have come through the winter nicely, and lambing has been upon a generous scale; but fear of the dog is holding back the sheep industry in Ontario. Loss of spring litters has been rather too common with sows, and several correspondents report cases of crippling of hogs; but otherwise there are few complaints made regarding this class of stock except that while high prices are being paid for pork the equally high cost of feed leaves very little profit for the farmer. A number of correspondents hold that on this account there will not be a surplus of hogs offering later in the season."

The bulletin which summarized returns sent in about the third week of August, said: "Pastures were in about average mid-August condition, ranging from 'dry and short' to 'good,' according to the time of the last local rainfall. Latest returns were to the effect that the fields were picking up owing to recent rains. Cattle were rather on the lean side, but were otherwise vigorous and healthy; in fact, no disease of any nature among live stock has been reported. The milk flow has been fully up to the standard, although now failing, as must be expected, with later summer conditions. All through the season dairy produce has been in brisk demand at good prices. While opinions are divided as to fall and winter supplies, most of the reports are of a confident nature, the corn crop being looked to to help out the shortness of hay and straw, and to supplement the other fodders. Several correspondents speak most favorably of lucerne as a good crop for helping to carry live stock along."

The November bulletin had the following concerning live stock: "Some correspondents, more particularly in the eastern portion of the Province, speak favorably of the condition of fall pastures, but the majority of the returns tell of rather close cropping. The result is that live stock as a rule are not in flesh, and there has been a steady culling out of poor animals, more especially among dairy cows. Good prices for all classes of live stock have also helped to lessen the number on hand. The general freedom from disease is a cause for satisfaction. Stockers have been scarce and dear, and young cattle are in good demand, but farmers generally are said to be a little slower than usual in starting stall feeding. Sheep raisers have done well this season, as there has been a good demand for lambs. Hogs have been steadily marketed all the year through, and, notwithstanding top prices, the demand cannot be fully met. Once more the corn crop has proved of great advantage to live stock men; silos are being erected in large numbers, both east and west, some of them being built of concrete."

THE DAIRY. Fall conditions respecting the dairy industry were thus referred to in the November bulletin: "The season, notwithstanding dry midsummer conditions, has been a good one for the dairy industry. Prices have been fair for cheese and high for butter, the latter branch of the industry relatively making most advance this summer. The general quality of butter was good, both in the creamery and dairy classes. While the milk flow was checked by the drouth somewhat earlier than usual, most dairymen have become wise by experience, and corn and other supplementary green feed helped to tide many over. The milk yield was better in the east than in the west, owing to better pastures. Two things are preventing an increase in the number of dairy cows: the lack of suitable labor and the steady culling out of the poor milkers. Correspondents in the counties of Leeds and Grenville report that under the new U. S. tariff a large quantity of cream is now being exported across the border, even some of our cheese factories preferring to separate their milk for that purpose. Three hundred correspondents have reported as to the favorite breed of dairy cow (including grades), and the four leading classes now rank in the following ratio for the Province: Holsteins, 8; Shorthorns, 6; Ayrshires, 3; Jerseys, 2. In Western Ontario, however, Shorthorns still lead Holsteins in the proportion of 5 to 4. The Ayrshires' popularity is mainly in the St. Lawrence and Ottawa counties."

The number of cheese factories in operation in 1909, as reported to the Director of Dairying by the dairy instructors, was 1,177. The amount of cheese made was 125,611,359 pounds, valued at $14,193,918. In 1908 the figures were 120,624,436 pounds, valued at $13,106,920. In the 97 public creameries there were made 9,015,206 pounds of butter, valued at $2,175,955, as compared with 9,895,109 pounds, worth $2,355,170 in 1908. These figures do not include the make in home dairies.

FODDER SUPPLIES. There was a hopeful ring in the following which appeared in the November bulletin: "The lessons of the last two years in husbanding fodder supplies have been well learned by Ontario farmers, and they face the coming winter with confidence. There is a shortage of hay compared with the average season, but most farmers have enough for local need, and it is of prime quality. Prices range all the way from $8 to $16 a ton, and some even higher, according to locality. Straw, which usually sells at about half the price of hay, is also scarce, but it is clean and of first-class quality. There will be plenty of turnips, but a lighter supply of the other roots. The immense yield of fodder corn, however, assures a fairly safe wintering of live stock, and will compensate for the high cost of bran, shorts and other mill feeds, which have receded but little from the famine prices of 1907. Except in a few individual cases, there is but little alarm expressed as to the sufficiency of fodder supplies should the winter be an ordinary one; and further, those who may have to reduce the number of their live stock to save feed are likely to get better prices than they could a year or two ago."

POULTRY. Good prices for fowl for the table, and equally good prices for eggs, notwithstanding the high cost of grain, are encouraging farmers to give more attention to poultry raising, and correspondents have more to say about the subject than ever before, several claiming that poultry-raising is one of the best paying branches of live stock on the farm. While some speak well of turkeys, there are a number of complaints of a heavy mortality early in the season among the young birds, and it is likely that there will be a scarcity for the winter market. With this exception, but little mention was made of disease among fowl this year.

STATISTICS. The following table gives the total numbers and value of the several classes of live stock and poultry on hand July 1st, 1909, together with live stock sold or slaughtered in the year preceding that date:

Live Stock.	Live stock on hand, July 1, 1909.		Sold or slaughtered in year ending June 30, 1909.	
	No.	Value.	No.	Value.
		$		$
Horses (all ages)	728,308	87,682,689	76,461	9,825,476
Cattle:—				
Milch cows	1,075,496	41,077,721	800,228	28,513,187
Other cattle	1,593,088	34,169,476		
Sheep and lambs	1,130,667	6,262,493	533,441	2,767,635
Swine (all ages)	1,551,187	11,144,135	1,986,432	21,407,549
Poultry (all kinds)	12,086,580	4,411,386	4,177,583	1,951,076
Totals:				
1909	....	184,747,900	....	64,464,923
1908	....	186,014,756	....	62,975,648

VALUE PER HEAD. The following table gives the average value per head of live stock and poultry:

Live Stock.	Live stock on hand July 1.				Sold or slaughtered in year ending June 30.			
	1909	1904	1899	1894	1909	1904	1899	1894
	$	$	$	$	$	$	$	$
Horses (all ages)	120	104	69	69	129	105	71	77
Cattle:—	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Milch cows	38 19	34 70	30 31	31 02	35 63	36 08	31 14	34 46
Other cattle	21 45	20 84	17 41	17 15				
Sheep and lambs	5 54	4 41	4 13	4 27	5 19	4 22	3 95	4 14
Swine (all ages)	7 18	6 43	5 16	6 05	10 78	10 12	7 55	9 86
Poultry (all kinds)	37	33	28	29	47	38	37	37

In 1897 horses sold for $62, cattle $26.54, sheep $3.46, swine $7.20.

FARM LABOR AND WAGES.

The August bulletin said: "Conditions relating to farm labor are practically unchanged. In most sections of the Province a sufficiency of labor was offered, but in many instances it was not up to the standard of quality. For this reason wages range all the way from $15 to $35 a month, and from $1 to $2 a day during harvest, with board, according to the experience and ability of the man. Several correspondents assert that the prevailing rates of wages are too high to leave any profit for the employer. The use of the latest machinery, and the interchange of work between farmers, greatly lessens the demand for ordinary farm laborers. This season, too, the short straw and good stand of the grain crops, together with favorable weather, made harvesting comparatively easy. Domestic labor is as scarce as ever, as comparatively few girls seem to care to undertake service in farm-houses."

Labor conditions were thus dealt with in the November bulletin: "There was a sufficiency of farm labor, generally speaking, although here and there a scarcity was reported. The quality of much of the labor offered was not up to the standard, and as many of the native-born farm hands are going to the West and North Ontario, the question of the fitness of those taking their places is becoming serious. Complaints are made, and sometimes in very strong language, that many of the immigrants seeking employment on the farms are failures, although some are giving excellent satisfaction. The wages of farm laborers are not likely to rise, but rather to fall, judging by the remarks of correspondents, who hold that farmers cannot afford to pay more, and will use more improved machinery and exchange help with their neighbors, seed more to grass, and raise more live stock, thus lightening labor. The domestic servant question has not yet found a satisfactory answer. The farmer's wife finds it as difficult as ever to procure extra help in her home tasks."

TEMPERATURES OF 1909.

TABLE 1.—Showing for each month the highest, lowest, mean highest, mean lowest, and mean temperature at the principal stations in Ontario for 1909; also the annual mean for each station.

Months.		Southampton.	Birnam.	London.	Woodstock.	Stoney Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Stonecliffe.
		°	°	°	°	°	°	°	°	°	°
January	Highest	56.8	60.0	60.5	60.0	62.0	57.0	45.6	43.0	40.0	43.0
	Lowest	— 6.2	—12.1	—14.5	—14.0	—13.0	— 2.6	—30.0	—17.0	—16.0	—29.0
	Mean highest	31.9	32.0	33.2	32.1	35.4	33.6	28.5	28.5	21.3	20.7
	Mean lowest	16.7	20.7	18.7	16.0	19.5	19.2	12.2	7.9	6.0	— 1.5
	Monthly mean	24.3	26.4	26.0	24.1	27.5	26.4	20.4	18.2	13.7	9.6
February	Highest	46.0	48.4	49.5	50.0	52.0	45.6	45.6	43.8	44.0	39.0
	Lowest	— 3.1	0.0	— 3.0	—10.0	— 6.0	— 8.7	—16.0	—22.2	—15.0	—29.0
	Mean highest	32.9	31.3	34.2	33.2	34.8	33.7	28.8	28.5	24.8	23.1
	Mean lowest	17.4	20.1	19.1	17.1	21.8	19.7	12.1	5.4	7.8	— 3.2
	Monthly mean	25.1	25.7	26.6	25.1	28.3	26.7	20.4	16.9	16.3	9.9
March	Highest	44.8	44.0	46.0	43.0	49.0	47.2	45.8	41.0	43.0	45.0
	Lowest	6.1	10.0	11.5	8.0	8.0	6.8	1.0	— 8.6	— 3.0	—22.0
	Mean highest	34.9	34.5	37.0	33.6	36.8	36.3	33.1	32.6	32.9	31.8
	Mean lowest	22.3	23.9	22.8	20.7	24.9	23.4	18.4	11.2	16.7	9.0
	Monthly mean	28.6	29.2	29.9	27.2	30.9	29.9	25.8	21.9	24.8	20.4
April	Highest	65.5	68.5	70.0	68.0	71.0	65.0	66.1	62.0	66.0	60.0
	Lowest	11.1	17.1	16.0	11.0	15.0	15.6	11.9	0.0	14.0	5.0
	Mean highest	46.7	50.1	52.6	49.8	51.2	48.8	47.2	43.0	45.6	41.7
	Mean lowest	29.2	32.7	32.1	31.0	33.3	33.0	29.6	25.3	28.8	23.5
	Monthly mean	37.9	41.4	42.3	40.4	42.2	40.9	38.4	34.1	37.2	32.6
May	Highest	80.1	79.5	84.5	80.8	82.0	82.2	80.2	76.0	75.0	74.0
	Lowest	29.1	30.0	29.0	24.0	34.0	30.6	24.0	28.0	30.0	25.0
	Mean highest	58.9	62.2	64.7	62.8	62.8	62.7	63.0	60.6	61.9	57.0
	Mean lowest	40.4	45.0	43.9	42.5	44.3	44.7	42.5	38.0	44.0	38.1
	Monthly mean	49.7	53.6	54.3	52.7	53.6	53.7	52.8	49.3	53.0	47.6
June	Highest	87.9	85.4	88.5	87.3	90.0	90.4	90.5	87.0	86.0	93.0
	Lowest	37.9	41.0	39.0	37.0	44.0	42.9	34.8	36.0	40.0	32.0
	Mean highest	72.4	74.0	77.8	74.6	74.2	75.4	78.2	75.3	74.5	77.3
	Mean lowest	51.6	56.7	54.6	54.3	55.7	55.5	52.6	48.4	53.4	47.0
	Monthly mean	62.0	65.3	66.2	64.4	64.9	65.4	65.4	61.8	63.9	62.1
July	Highest	85.4	88.1	90.5	86.5	93.0	86.9	86.6	86.0	85.0	88.0
	Lowest	46.2	42.0	42.5	44.9	48.0	47.6	46.7	41.0	47.0	40.0
	Mean highest	73.6	78.0	81.3	78.0	80.7	77.9	77.2	75.5	74.9	73.5
	Mean lowest	55.9	58.2	56.7	55.9	58.3	57.5	54.6	52.9	57.5	52.3
	Monthly mean	64.8	68.1	69.0	67.0	69.5	67.7	65.9	64.2	66.2	62.9
August	Highest	86.9	91.0	93.5	92.0	97.0	95.8	91.9	85.0	87.0	86.0
	Lowest	40.1	42.5	42.0	41.0	42.0	45.5	40.0	33.0	43.0	37.0
	Mean highest	76.3	77.7	82.4	78.6	79.9	79.1	78.5	76.1	75.7	74.1
	Mean lowest	58.1	58.5	56.8	56.1	57.8	59.1	54.9	52.3	55.7	51.7
	Monthly mean	67.2	68.1	69.6	67.3	68.8	69.1	66.7	64.2	65.7	62.9
September	Highest	90.5	87.5	89.5	88.0	94.0	88.9	90.4	87.0	82.0	86.0
	Lowest	36.1	30.5	30.5	31.0	36.0	40.8	32.9	28.0	37.0	34.0
	Mean highest	66.9	68.2	71.7	68.9	70.9	70.3	68.8	65.1	65.9	66.4
	Mean lowest	50.5	48.7	47.9	47.2	49.3	50.4	45.9	44.1	47.8	43.8
	Monthly mean	58.7	58.5	59.8	58.1	60.1	60.4	57.4	54.6	56.9	55.1
October	Highest	77.3	77.0	80.5	77.5	79.0	76.7	77.6	75.0	74.0	79.0
	Lowest	24.1	27.4	24.0	25.0	22.0	21.3	18.7	15.8	22.0	15.0
	Mean highest	52.5	53.1	55.8	54.8	56.0	55.5	54.1	51.3	52.6	55.1
	Mean lowest	38.5	36.9	35.2	34.8	36.6	36.9	34.0	33.0	36.9	33.4
	Monthly mean	45.5	45.0	45.5	44.8	46.3	41.2	44.0	42.1	44.7	44.2
November	Highest	68.3	67.3	68.5	66.5	68.0	63.8	67.4	66.0	63.0	61.0
	Lowest	5.1	11.0	15.5	14.0	21.0	13.7	6.0	1.2	7.0	—11.0
	Mean highest	49.3	48.8	51.0	50.5	48.6	48.3	47.2	44.4	42.3	44.0
	Mean lowest	31.5	35.5	33.6	31.9	34.6	32.8	30.3	27.4	28.5	24.6
	Monthly mean	40.4	42.2	42.3	41.2	41.6	40.6	38.8	35.9	35.4	34.3
December	Highest	47.8	51.9	51.5	45.2	44.0	44.9	44.9	41.0	35.0	44.0
	Lowest	0.9	4.7	0.0	— 4.5	— 5.0	— 5.0	—12.0	— 7.4	—10.0	—16.0
	Mean highest	31.8	27.4	29.4	29.1	31.6	31.7	28.7	28.3	24.4	29.2
	Mean lowest	19.2	18.9	17.7	16.4	20.7	20.2	14.9	14.9	13.7	10.8
	Monthly mean	25.5	23.1	23.5	22.7	21.1	25.9	21.8	21.6	19.0	20.0
Annual mean		44.1	45.6	46.3	44.6	46.2	46.1	43.2	41.2	41.4	38.5

AVERAGE TEMPERATURE FOR TWENTY-EIGHT YEARS.

TABLE II.—Showing for each month the monthly average for the highest, lowest, mean highest, mean lowest and mean temperature at the principal stations in Ontario, derived from the twenty-eight years, 1882-1909, also the annual mean at each station for the same period.

Months.		Southampton.	Birnam.	London.	Woodstock.	Stoney Creek.	Toronto.	Lindsay.	Gravenhurst.	Ottawa.	Stonecliffe.
		°	°	°	°	°	°	°	°	°	°
January	Highest	45.3	46.9	47.1	46.6	51.7	45.5	42.0	41.7	40.3	38.1
	Lowest	—7.1	—9.5	—9.6	—11.5	—6.5	—7.5	—20.4	—27.1	—21.2	—34.5
	Mean highest	28.4	27.2	28.9	27.9	32.5	29.1	24.4	24.2	19.9	18.2
	Mean lowest	13.5	15.0	13.9	11.6	18.1	14.5	6.8	3.9	1.9	—6.0
	Monthly mean	21.0	21.1	21.4	19.8	25.3	21.8	15.6	14.1	10.9	6.1
February	Highest	44.6	46.9	46.2	45.5	48.3	44.1	42.1	42.1	40.2	41.5
	Lowest	—11.2	—12.4	—11.9	—11.8	—6.2	—8.4	—18.6	—26.6	—20.8	—35.3
	Mean highest	27.6	26.7	28.4	27.7	30.9	28.6	25.2	24.9	21.8	21.7
	Mean lowest	10.9	12.8	11.6	10.4	14.9	13.1	5.5	3.0	3.3	—1.3
	Monthly mean	19.2	19.7	20.0	19.0	22.9	20.8	15.3	13.9	12.5	10.2
March	Highest	53.4	57.7	57.8	55.8	59.5	53.6	50.7	50.1	47.2	50.2
	Lowest	—3.0	—2.3	—1.2	—1.7	5.5	3.9	—6.8	—13.3	—8.4	—24.3
	Mean highest	35.1	36.1	37.6	36.1	39.8	36.2	34.0	33.8	32.4	33.0
	Mean lowest	18.1	21.4	20.6	18.8	24.9	21.9	15.9	12.9	15.0	7.0
	Monthly mean	26.6	28.8	29.1	27.5	32.4	29.1	25.0	23.4	23.7	20.0
April	Highest	72.6	76.5	75.8	74.4	77.0	70.8	73.8	70.7	73.1	73.4
	Lowest	15.1	17.8	18.3	17.0	22.8	20.8	13.7	10.6	14.8	6.1
	Mean highest	49.2	52.2	53.0	52.2	53.2	50.6	51.7	49.6	50.6	50.6
	Mean lowest	31.1	33.9	32.6	31.7	35.5	33.8	30.6	28.7	31.1	26.1
	Monthly mean	40.1	43.0	42.8	41.9	44.3	42.2	41.1	39.1	40.8	38.3
May	Highest	80.0	82.4	82.5	81.1	84.6	78.9	82.4	81.4	82.8	84.0
	Lowest	28.4	29.1	29.6	28.8	33.5	31.8	27.9	27.2	30.9	24.0
	Mean highest	61.1	65.3	66.5	64.7	65.3	62.8	65.7	63.7	66.0	65.1
	Mean lowest	41.3	44.5	44.1	42.5	44.9	44.0	42.1	41.2	43.5	38.4
	Monthly mean	51.2	54.9	55.3	53.6	55.1	53.4	53.9	52.5	54.8	51.8
June	Highest	85.5	88.0	88.0	87.1	91.8	86.9	88.9	87.1	88.2	89.6
	Lowest	37.5	37.6	38.2	38.6	42.6	42.6	39.1	36.8	42.2	33.7
	Mean highest	70.9	75.3	76.2	75.4	77.2	74.0	76.1	74.9	76.0	75.9
	Mean lowest	50.9	53.7	53.5	51.9	55.5	54.0	51.5	50.9	54.1	48.0
	Monthly mean	60.9	64.5	64.8	63.6	66.3	64.0	63.8	62.9	65.0	61.9
July	Highest	87.2	91.7	91.3	89.8	95.2	90.4	90.9	89.0	90.8	90.6
	Lowest	43.4	42.7	43.7	44.1	48.9	48.3	43.9	43.0	47.3	40.1
	Mean highest	77.0	79.6	80.1	79.3	82.7	78.7	79.7	78.1	79.0	78.0
	Mean lowest	56.0	57.4	57.2	55.6	60.8	58.5	55.4	55.4	58.3	52.9
	Monthly mean	66.5	68.5	68.7	67.5	71.8	68.6	67.6	66.8	68.7	65.5
August	Highest	86.1	89.9	89.7	88.6	93.4	88.1	89.5	87.6	88.4	87.8
	Lowest	41.8	42.1	40.6	41.6	46.3	46.5	40.5	39.6	43.7	37.3
	Mean highest	73.9	77.0	77.8	77.2	80.6	76.4	77.5	75.9	76.2	74.9
	Mean lowest	55.2	55.8	54.4	52.1	58.5	53.5	53.3	53.0	55.4	50.1
	Monthly mean	64.5	66.4	61.1	64.6	69.5	64.9	65.4	64.4	65.8	62.5
September	Highest	84.8	87.1	86.4	85.9	90.7	84.7	86.2	83.9	84.5	84.4
	Lowest	34.2	33.6	31.8	31.3	36.7	36.8	31.6	31.5	33.4	29.3
	Mean highest	68.5	70.8	71.5	70.4	74.1	69.4	69.7	68.7	68.5	67.7
	Mean lowest	50.0	50.9	49.5	47.4	52.8	50.9	47.0	47.0	48.1	43.7
	Monthly mean	59.3	60.9	60.5	58.9	63.5	60.2	58.4	57.9	58.3	55.7
October	Highest	74.3	75.8	75.5	74.4	77.6	72.6	73.9	72.4	70.8	73.0
	Lowest	24.8	25.0	23.6	22.8	25.9	26.0	21.0	21.1	23.3	17.5
	Mean highest	56.0	56.9	57.7	56.4	60.7	56.0	55.3	55.1	53.8	53.2
	Mean lowest	39.4	40.4	38.0	36.7	41.1	39.8	36.0	36.5	36.7	33.0
	Monthly mean	47.7	48.6	47.8	46.5	50.9	47.9	45.6	45.8	45.2	43.1
November	Highest	60.9	62.5	62.0	61.3	65.5	59.8	59.2	58.7	57.0	55.8
	Lowest	13.9	12.7	12.4	11.2	17.2	14.5	5.4	7.1	6.4	—0.8
	Mean highest	43.5	43.0	44.3	43.0	47.1	43.7	40.8	40.6	38.5	37.0
	Mean lowest	30.1	30.8	29.4	27.9	32.4	30.7	26.1	26.1	25.6	21.8
	Monthly mean	36.8	36.9	36.9	35.5	39.8	37.2	33.5	33.4	32.1	29.4
December	Highest	49.3	48.6	53.8	49.0	53.7	48.1	44.7	44.5	42.2	44.4
	Lowest	—0.1	—1.1	—2.2	—3.3	1.6	—1.8	—13.5	—14.1	—15.6	—25.9
	Mean highest	33.2	31.6	33.0	32.0	35.8	33.5	28.8	29.1	24.6	23.8
	Mean lowest	20.3	20.7	19.7	17.9	22.7	20.7	13.3	12.6	9.2	3.9
	Monthly mean	26.7	26.1	26.3	24.9	29.2	27.1	21.0	20.8	16.9	13.8
Annual mean		43.4	44.9	46.0	43.6	47.6	44.8	42.2	41.2	41.2	38.2

RAIN AND SNOW.

Table IV. Monthly summary of inches of rain and snow in precipitation in the several districts of Ontario in 1909; also the average derived from the twenty-eight years, 1882-1909.

Districts.		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
West and Southwest :														
Rain.	1909	1.43	2.17	1.68	3.53	4.78	2.16	2.26	2.64	0.98	1.52	3.78	1.39	28.32
	1882-1909	1.14	1.24	1.38	1.86	3.19	2.98	2.89	2.53	2.50	2.66	2.28	1.58	26.23
Snow.	1909	11.2	15.3	9.3	8.5	0.2					0.8	3.8	12.5	61.6
	1882-1909	15.1	13.0	8.4	2.6	0.1					0.6	4.9	12.0	56.7
Northwest and North :														
Rain.	1909	1.19	0.92	0.33	2.99	2.17	0.93	4.63	2.30	2.75	2.16	2.25	0.43	23.05
	1882-1909	0.78	0.51	1.00	1.50	2.66	2.77	2.97	2.75	3.03	2.91	1.89	0.93	23.70
Snow.	1909	12.5	19.7	20.9	10.3	1.1					2.7	9.1	34.8	111.1
	1882-1909	25.2	20.4	13.2	3.7	0.4					1.5	12.2	22.5	99.1
Centre :														
Rain.	1909	1.03	1.48	0.90	4.38	3.22	1.30	4.03	1.53	1.86	1.58	3.36	1.09	25.76
	1882-1909	1.08	1.01	1.33	1.82	2.86	2.82	2.89	2.41	2.31	2.43	2.02	1.37	24.35
Snow.	1909	13.3	14.8	18.3	5.2	0.6					0.8	2.6	15.3	70.9
	1882-1909	17.4	14.6	9.7	3.1	0.2					0.6	5.1	12.0	62.7
East and North-east :														
Rain.	1909	1.52	1.50	1.34	3.05	3.59	1.06	5.17	2.25	2.04	1.67	2.72	0.82	26.73
	1882-1909	0.89	0.69	1.19	1.54	2.67	2.83	3.04	2.53	2.52	2.28	1.84	1.16	23.18
Snow.	1909	9.0	14.8	18.6	5.0	0.7					0.1	4.2	13.5	65.9
	1882-1909	20.2	17.3	10.9	3.3	0.3					0.8	7.2	14.8	74.8
The Province :														
Rain.	1909	1.29	1.52	1.06	3.48	3.44	1.36	4.02	2.18	1.91	1.73	3.03	0.93	25.95
	1882-1909	0.97	0.89	1.22	1.68	2.85	2.85	2.95	2.55	2.59	2.57	2.01	1.26	24.39
Snow.	1909	11.5	16.2	16.8	7.2	0.6					1.1	4.9	19.0	77.3
	1882-1909	19.5	16.3	10.6	3.2	0.2					0.9	7.3	15.3	73.3

SUNSHINE.

Table V. Monthly summary of bright sunshine at the principal stations in Ontario for 1909, showing the number of hours the sun was above the horizon, the hours of registered sunlight, the total for the year, and the average derived from the twenty-eight years, 1882-1909.

Stations.		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
		hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
Sun above the horizon		285.7	291.4	369.9	406.4	461.1	465.7	470.9	434.5	376.3	340.2	286.9	274.3	4463.3
Woodstock	1909.....	69.0	46.4	89.0	149.0	183.3	221.9	307.1	263.7	175.1	133.0	97.8	47.7	1783.0
	1882-1909	63.2	88.5	120.6	173.2	206.4	245.6	274.2	238.8	175.3	146.6	73.6	53.8	1859.8
Toronto...........	1909.....	70.2	69.0	158.5	168.2	209.6	283.3	306.3	287.3	199.5	127.0	104.0	85.0	2067.9
	1882-1909	79.0	107.7	148.0	191.3	219.5	259.8	283.5	254.5	208.9	149.4	83.9	64.2	2049.7
Lindsay...........	1909.....	63.2	65.6	149.9	135.2	156.3	270.2	238.5	242.8	167.7	122.3	93.9	54.6	1760.2
	1882-1909	77.4	104.5	148.9	193.2	212.2	245.7	258.7	239.6	194.7	137.2	73.0	56.0	1941.1
Kingston	1909.....	66.9	89.4	154.5	158.2	212.9	291.2	241.0	293.5	179.2	122.0	93.7	32.9	1935.4
	1882-1909	76.9	109.9	149.8	187.5	201.5	251.5	267.2	251.7	190.8	139.0	78.8	66.7	1971.3
Ottawa...	1909.....	66.2	112.4	156.8	172.7	195.5	255.0	236.9	279.7	190.6	136.3	87.9	59.4	1949.4
	1882-1909	82.4	105.9	141.0	184.8	221.9	224.7	244.0	239.1	165.6	126.2	84.8	56.9	1877.3
Average of five stations	1909.....	67.1	76.6	141.7	156.7	191.5	264.3	266.0	273.4	182.4	128.1	95.5	55.9	1899.2
	1908.....	92.3	120.9	95.2	177.3	188.2	332.9	295.4	263.3	177.0	162.3	72.1	61.6	2038.5
	1882-1909	75.8	103.3	141.7	186.0	212.3	245.7	265.5	244.7	187.1	139.7	78.8	59.5	1940.1

RAIN AND SNOW.

TABLE III.—Summary of the total fall of rain and snow, and the number of days on which rain and snow fell in Ontario, during 1909, at stations reporting the whole year, and the average for the Province.

Station.	Rain.		Snow.	
	Inches.	Days.	Inches.	Days.
ALGOMA:				
Bruce Mines	19.67	77	112.2	50
BRANT:				
Brantford	28.38	72	44.0	17
Paris	30.34	82	52.5	22
BRUCE:				
North Bruce	26.23	89	87.9	58
Southampton	27.35	109	144.3	76
Wiarton	24.80	79	110.8	39
CARLETON:				
Ottawa	31.19	109	90.3	50
DUFFERIN:				
Orangeville	33.21	60	124.1	48
ESSEX:				
Cottam	37.88	86	49.2	19
Windsor	37.19	86	42.5	19
ELGIN:				
Dutton	24.89	39	51.0	19
Port Burwell	32.56	76	54.8	23
Port Stanley	31.57	123	68.0	67
FRONTENAC:				
Arden	30.92	102	46.0	23
Kingston	32.86	126	51.3	56
Sydenham	33.33	48	42.5	15
GREY:				
Owen Sound	27.38	90	193.3	66
HALTON:				
Georgetown	24.70	116	57.4	44
HASTINGS:				
Madoc	29.94	90	88.0	43
HURON:				
Clinton	31.09	105	122.0	55
Goderich	18.88	61	73.0	29
Lucknow	29.22	92	159.6	76
KENT:				
Chatham	25.39	54	50.5	13
LAMBTON:				
Birnam	28.43	83	89.1	40
Sarnia	11.07	28	43.8	15
LANARK:				
MacCue	29.86	50	48.7	17
Montague	24.02	44	27.8	13
LEEDS:				
Lansdowne	15.68	26	21.0	11
Westport	26.54	78	47.1	39
MANITOULIN:				
Cockburn Island	18.78	56	102.1	43
MIDDLESEX:				
London	28.62	96	132.8	55
Strathroy	32.35	82	86.5	31
Westminster	26.69	42	65.0	12
MUSKOKA:				
Beatrice	27.63	76	130.0	50
Gravenhurst	27.97	83	129.8	63
NIPISSING:				
Copper Cliff	15.48	54	77.5	33
Haileybury	21.08	108	121.4	71
Lake Talon	18.22	56	78.0	37
NORFOLK:				
Port Dover	32.56	107	91.9	55
NORTHUMBERLAND:				
Wooler	29.86	61	45.0	18
ONTARIO:				
Uxbridge	23.44	78	72.5	40
OXFORD:				
Princeton	28.17	49	60.0	15
Woodstock	24.45	89	39.9	30
PARRY SOUND:				
Emsdale	28.89	89	86.2	52
Parry Sound	27.43	83	131.5	51
Uplands	15.64	66	136.1	55
PEEL:				
Alton	26.62	78	77.1	43
PETERBOROUGH:				
Ennismore	27.05	45	52.0	21
Lakefield	21.30	65	96.1	37
Otonabee	21.56	58	63.0	34
Peterborough	25.06	66	81.5	35
RENFREW:				
Renfrew	20.91	92	118.7	65
Stonecliffe	20.09	94	78.4	59
SIMCOE:				
Barrie	27.53	110	116.2	87
Coldwater	23.94	54	107.2	32
Midland	21.85	56	134.8	47
Orillia	21.41	43	79.0	22
THUNDER BAY:				
Kakabeka Falls	16.46	70	72.9	48
Port Arthur	16.18	65	48.0	38
VICTORIA:				
Lindsay	34.21	108	122.4	59
WENTWORTH:				
Stoney Creek	25.40	57	58.6	17
WELLINGTON:				
Guelph	21.15	82	27.0	25
WELLAND:				
Welland	24.23	96	74.0	32
YORK:				
Aurora	25.18	66	64.9	31
Agincourt	25.89	87	56.2	39
Deer Park	23.37	75	55.6	24
Toronto	26.02	110	68.3	51
Toronto East	23.63	81	50.3	21
Average for the Province: 1909	25.95	77	77.3	39
1908	18.76	65	85.3	40
1907	23.18	73	66.6	38
1906	27.06	76	52.4	32
1905	24.90	78	64.3	39
1905-1909	23.97	74	69.2	38
1882-1909	24.39	84	73.3	40

RURAL AREA ASSESSED.

TABLE VI.—Showing by County Municipalities the rural area of Ontario as returned by Municipal assessors for 1909; also the comparative totals for the Province for the five years, 1905-1909.

Counties and Districts.	Acres of assessed land.	Acres cleared.	Acres of woodland.	Acres of slash land.	Acres of swamp, marsh or wasteland.	Per cent. cleared.
Algoma	307,070	42,665	229,071	12,241	23,093	13.89
Brant	215,918	178,312	11,480	13,823	12,303	82.58
Bruce	925,197	556,191	180,421	78,587	109,998	60.12
Carleton	563,847	347,203	51,704	103,837	61,103	61.58
Dufferin	356,389	260,002	28,794	29,363	38,230	72.95
Dundas	237,500	171,118	27,742	29,587	9,053	72.05
Durham	371,324	301,980	31,737	7,917	29,690	81 33
Elgin	435,459	348,294	61,567	20,225	5,373	79.98
Essex	427,972	328,043	48,135	43,333	8,461	76.65
Frontenac	702,113	285,053	167,990	125,774	123,296	40.60
Glengarry	286,862	197,683	52,135	13,328	23,716	68.91
Grenville	272,223	184,520	33,987	20,089	33,627	67.78
Grey	1,067,614	696,110	134,125	65,071	172,308	65.20
Haldimand	281,068	239,480	32,583	7,805	1,200	85.20
Haliburton	584,171	44,146	280,334	37,382	222,309	7.55
Halton	224,259	174,167	18,083	23,926	8,083	77 66
Hastings	1,071,518	434,592	285,769	144,458	206,699	40.56
Huron	799,435	652,167	56,566	24,634	66,068	81.58
Kent	566,085	462,617	42,368	41,777	19,323	81.72
Lambton	659,640	468,796	79,100	91,076	20,668	71.07
Lanark	671,546	326,723	176,475	73,808	94,540	48.65
Leeds	466,814	264,957	101,699	34,394	65,764	56.76
Lennox & Addington	443,332	265,577	101,515	24,232	52,008	59.90
Lincoln	190,919	161,973	17,068	9,868	2,010	84.84
Manitoulin	274,548	44,165	66,552	92,700	71,131	16.09
Middlesex	758,868	659,239	73,441	14,738	11,450	86.87
Muskoka	562,541	65,043	329,003	76,161	92,334	11.56
Nipissing	473,835	48,202	348,071	21,957	55,605	10.17
Norfolk	398,136	272,653	68,186	29,623	27,674	68.48
Northumberland	436,675	342,412	39,860	20,899	33,504	78.41
Ontario	504,551	368,529	25,608	44,330	66,084	73.04
Oxford	471,496	395,686	35,872	18,750	21,188	83.92
Parry Sound	622,296	82,533	365,393	59,853	114,517	13.26
Peel	289,962	262,869	9,905	5,018	12,170	90.66
Perth	518,322	444,313	37,062	27,016	9,931	85.72
Peterborough	572,941	252,982	127,632	103,024	89,303	44.15
Prescott	293,403	207,188	30,485	38,265	17,465	70.62
Prince Edward	233,837	195,364	18,917	7,138	12,418	83.55
Rainy River	347,364	26,406	232,238	32,932	55,788	7.60
Renfrew	1,040,984	346,582	383,042	107,217	204,143	33.29
Russell	251,080	128,283	36,951	80,837	5,009	51.09
Simcoe	983,773	656,995	104,196	147,363	75,219	66.78
Stormont	246,550	148,249	40,104	35,108	23,089	60.13
Sudbury	363,916	36,071	250,561	16,896	60,388	9.91
Thunder Bay	332,372	11.786	299,402	12,033	9,151	3.55
Victoria	599,926	283,984	43,430	105,452	167,060	47.34
Waterloo	306,779	251,850	32,248	6,156	16,525	82.09
Welland	227,727	185,572	19,528	13,334	9,293	81.49
Wellington	628,508	495,822	34,950	14,403	83,333	78.89
Wentworth	271,596	214,194	16,353	11,881	29,168	78.86
York	536,622	437,828	32,300	17,264	49,230	81.59
The Province.						
1909	24,676,883	14,257,169	5,351,738	2,236,883	2,831,093	57.78
1908	24,497,406	14,132,061	5,331,654	2,273,251	2,760,440	57.69
1907	24,392,119	14,116,474	5,422,650	2,080,591	2,772,404	57.87
1906	24,284,730	14,107,015	5,449,125	1,963,350	2,765,240	58.09
1905	24,184,540	13,931,437	5,594,673	1,811,992	2,846,438	57.60

NOTE.—Statistics for Kenora are included with Rainy River in this and following tables.

FALL WHEAT AND SPRING WHEAT.

TABLE VII.—Showing by County Municipalities of Ontario the area, produce and market value of Fall Wheat and Spring Wheat for the year 1909, together with the totals for the Province for the past five years, the average for the five years, 1905-1909, and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Fall Wheat.				Spring Wheat.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma..........	144	3,283	22.8	3,447	713	13,404	18.8	13,806
Brant...........	23,078	574,642	24.9	591,881	....	....	......	....
Bruce...........	33,274	751,992	22.6	767,032	2,263	41,866	18.5	41,657
Carleton.........	24	540	22.5	567	3,588	68,172	19.0	68,854
Dufferin........	3,892	94,576	24.3	98,359	2,314	40,495	17.5	40,495
Dundas.........	158	3,555	22.5	3,697	97	1,892	19.5	1,949
Durham.........	4,880	117,120	24.0	120,634	8,732	111,770	12.8	111 770
Elgin............	24,732	625,720	25.3	638,234	102	2,040	20.0	2,040
Essex...........	16,173	389,769	24.1	388,989	609	11,388	18.7	11,388
Frontenac.......	702	12,425	17.7	12,425	1,391	22,395	16.1	22,395
Glengarry.......	88	1,760	20.0	1,760	1,964	32,602	16.6	33,580
Glenville........	120	2,400	20.0	2,472	420	8,442	20.1	8,526
Grey............	22,816	527,050	23.1	532,321	5,385	90,468	16.8	88,749
Haldimand......	27,671	478,708	17.3	488,282	229	3,435	15.0	3,363
Haliburton.......	....	....	......	....	489	7,237	14.8	7,063
Halton..........	17,520	350,400	20.0	367,920	771	9,098	11.8	9,189
Hastings........	2,937	58,446	19.9	57.628	2,739	40,811	14.9	39,791
Huron...........	33,696	828,922	24.6	845,500	2,367	40,949	17.3	40,171
Kent............	51,025	1,290,933	25.3	1,316,752	354	6,797	19.2	6,797
Lambton.........	28.308	634,099	22.4	646,781	424	7,844	18.5	8,079
Lanark..........	734	10,129	13.8	10,332	6,303	98,957	15.7	99,947
Leeds...........	1,136	19,653	17.3	21,029	709	12,053	17.0	12,776
Lennox and Add..	1,800	30,960	17.2	30,960	3,777	57,410	15.2	57,410
Lincoln..........	11,682	227,799	19.5	236,911	144	2,117	14.7	2,138
Manitoulin......	540	10,368	19.2	10.679	782	13,841	17.7	14,395
Middlesex.......	45,144	1,124,086	24.9	1,146,568	243	4,155	17.1	4,072
Muskoka........	26	494	19.0	494	367	5,725	15.6	5,840
Nipissing........	195	5,870	30.1	6,281	546	12,067	22.1	12,670
Norfolk..........	27,707	709,299	25.6	716,392	67	1,273	19.0	1,236
Northumberland .	8,820	194,040	22.0	199,861	3,176	41,606	13.1	42,022
Ontario..........	12,613	316,586	25.1	326,084	10,831	170,047	15.7	171,747
Oxford..........	26,112	793,805	30.4	817,619	75	1,650	22.0	1,667
Parry Sound.....	21	378	18.0	393	462	8,224	17.8	8,471
Peel.............	12,752	334,102	26.2	344,125	2,856	47,124	16.5	46,936
Perth...........	29,166	851,647	29.2	877,196	773	16,542	21.4	16,128
Peterborough....	9,235	204,094	22.1	208,176	2,414	41,038	17.0	40,669
Prescott.........	74	1,480	20.0	1,480	3,945	62,726	15.9	63,981
Prince Edward ..	1,823	38,283	21.0	37,785	1,240	19,096	15.4	18,752
Rainy River.....	160	4,496	28.1	4,721	500	13,150	26.3	13,150
Renfrew.........	419	6,914	16.5	7,052	29,816	480,038	16.1	494,439
Russell..........	18	405	22.5	405	1,717	31,078	18.1	31,700
Simcoe..........	63,793	1,416,205	22.2	1,444,529	8,019	129,106	16.1	129,106
Stormont........	12	240	20.0	240	673	14,873	22.1	15,617
Sudbury.........	160	3,600	22.5	3,780	240	5,040	21.0	5,393
Thunder Bay....	....	....	......	....	133	3,378	25.4	3,547
Victoria.........	6,996	154,612	22.1	156,158	6.414	101,983	15.9	97,904
Waterloo........	31,123	877,669	28.2	895,222	169	2,991	17.7	3,081
Welland........	17,833	312,078	17.5	321,440	78	1,170	15.0	1,217
Wellington......	11,403	318,144	27.9	321,325	5,070	103,428	20.4	99,291
Wentworth......	20,607	476,022	23.1	495,063	271	4,336	16.0	4,423
York............	30,033	777,855	25.9	808,969	8,400	156,240	18.6	157,802
The Province:								
1909.........	663,375	15,967,653	24.1	16,335,950	135,161	2,223,567	16.5	2,237,189
1908.........	679,642	16,430,476	24.2	14,649,061	142,124	2,197,716	15.5	1,996,230
1907.........	676,164	15,545,491	23.0	14,410,670	144,514	2,473,651	17.1	2,137,234
1906.........	787,287	18,841,774	23.9	13,321,134	171,745	3,267,000	19.0	2,250,963
1905.........	796,213	17,933,961	22.5	13,719,480	190,116	3,582,627	18.8	2,683,387
Average (5 years) 1905-1909....	720,536	16,943,871	23.5	13,687,259	156,732	2,748,912	17.5	2,261,001
Average (28 years) 1882-1909....	855,649	17,808,282	20.8	14,205,075	384,262	6,100,101	15.9	4,940,921

BARLEY AND OATS.

TABLE VIII.—Showing by County Municipalities of Ontario the area, produce and market value of Barley and Oats for the year 1909, together with the totals for the Province for the past five years, the average for the five years, 1905-1909, and the average for the twenty-eight years 1882-1909.

Counties and Districts.	Barley.				Oats.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma.........	1,505	46,053	30.6	30,579	7,927	263,969	52.3	138,056
Brant...........	10,881	264,408	24.3	153,357	28,110	874,221	31.1	365,424
Bruce...........	20,372	588.751	28.9	306,151	103,806	3,508,643	33.8	1,305,215
Carleton	9,679	321,343	33.2	175,132	97,982	3,742,912	38.2	1,426,049
Dufferin	21,463	605,257	28.2	312,313	64,330	2,380,210	37.0	875,917
Dundas	3,895	124,251	31.9	69,581	34,855	1,401,171	40.2	578,684
Durham.........	19,937	468,520	23.5	260,497	52,820	1,848,700	35.0	713,598
Elgin	9,302	223,248	24.0	134,619	48,460	1,313,266	27.1	593,596
Essex...........	10,442	258,962	24.8	135,696	70,113	2,166,492	30.9	805,935
Frontenac	5,096	114,150	22.4	64,495	48,542	1,344,613	27.7	566,082
Glengarry	6,322	180,809	28.6	101,795	43,231	1,435,269	33.2	543,967
Grenville	2,640	77,352	29.3	47,107	33,950	1,252,755	36.9	528,663
Grey............	32,723	939,150	28.7	483,662	138,093	4,695,162	34,0	1,793,552
Haldimand	7,812	154,678	19.8	88,476	37,161	891,864	24.0	373,691
Haliburton......	925	23,033	24.9	13,613	6,987	210,309	30.1	90,643
Halton	9,386	204,615	21.8	119,700	26,800	812,040	30.3	340,245
Hastings	19,433	464,449	23.9	276,812	79,233	2,535,456	32.0	1,059,821
Huron...........	32,864	1,025,357	31.2	527,033	121,607	4,499,459	37.0	1,660,300
Kent............	28,177	766,414	27.2	417,695	72,616	2,468,944	34.0	970,295
Lambton........	24,012	542,671	22.6	282,732	88,150	2,344,790	26.6	867,572
Lanark.	5,977	161,977	27.1	88,925	46,854	1,555,553	33.2	633,110
Leeds	4,050	108,540	26.8	64,473	47,351	1,420,530	30.0	613,669
Lennox and Add.	9,557	214,077	22.4	124,165	42,431	1,272,930	30.0	537,176
Lincoln.........	3,085	62,934	20.4	38,012	23,190	554,241	23.9	235,552
Manitoulin......	1,553	44,261	28.5	27,884	6,573	191,932	29.2	105,179
Middlesex.......	22,742	573,098	25.2	311,765	105,751	2,929,303	27.7	1,157,075
Muskoka	444	10,523	23.7	6,840	12,762	400,727	44.4	177,923
Nipissing	783	26,231	33.5	17,575	8,211	307,913	37.5	148,106
Norfolk	5,533	143,858	26.0	79,841	34,993	937,812	26.8	394,819
Northumberland	14,975	366,888	24.5	207,292	58,595	1,927,776	32.9	765,327
Ontario.........	30,576	837,782	27.4	454,078	73,161	2,765,486	37.8	1,081,305
Oxford	17,800	582,060	32.7	327,118	76,410	2,681,991	35.1	1,139,846
Parry Sound....	940	23,218	24.7	15,231	16,466	454,462	27.6	218,142
Peel............	29,839	620,651	20.8	365,563	49,174	1,637,494	33.3	671,373
Perth	28,777	972,663	33.8	502,867	94,728	3,694,392	39.0	1,389,091
Peterborough ...	10,360	252,784	24.4	138,020	56,875	1,865,500	32.8	714,487
Prescott	6,038	162,422	26.9	95,504	49,247	1,531,582	31.1	600,380
Prince Edward..	13,441	279,573	20.8	158,238	25,034	720,979	28.8	304,974
Rainy River.....	1,034	38,775	37.5	24,234	4,053	173,874	42.9	80,504
Renfrew.	4,405	106,161	24.1	57,539	69,272	2,119,723	30.6	780,058
Russell	3,584	112,538	31.4	64,372	30,101	1,092,666	36.3	416,306
Simcoe	66,371	1,845,114	27.8	963,150	138,690	5,034,447	36.3	1,877,849
Stormont	3,378	107,083	31.7	60,181	28,167	1,075,979	38.2	429,316
Sudbury	1,127	29,866	26.5	19,413	6,267	169,836	27.1	84,918
Thunder Bay....	513	14,415	28.1	10,091	2,025	79,785	39.4	33,749
Victoria.........	19,680	543,168	27.6	285,163	63,558	2,249,953	35.4	834,733
Waterloo.	17,627	488,268	27.7	266,106	53,101	1,943,497	36.6	816,269
Welland.	2,767	51,466	18.6	31.240	24,661	525,279	21.3	233,224
Wellington......	33,150	1,030,965	31.1	564,969	108,477	4,089,583	37.7	1,529,504
Wentworth	11,833	280,442	23.7	163,778	35,842	1,086,013	30.3	457,211
York	46,457	1,291,505	27.8	751,656	98,792	3,754,096	38.0	1,554,196
The Province:								
1909........	695,262	18,776,777	27.0	10,286,328	2,695,585	90,235,579	33.5	35,612,676
1908........	734,029	20,888,569	28.5	10,943,788	2,774,259	96,626,419	34.8	38,987,985
1907........	766,891	21,718,332	28.3	12,900,689	2,932,509	83,524,301	28.5	40,759,859
1906........	756,163	25,253,011	33.4	11,363,855	2,716,711	108,341,455	39.9	36,836,095
1905........	772,633	24,265,394	31.4	10,409,854	2 668,416	105,563,572	39.6	35,469,360
Average (5 years) 1905-1909 ...	744,996	22,180,417	29.8	11,180,903	2,757,496	96,858,265	35.1	37,533,195
Average (28 yrs.) 1882-1909 ...	653,238	18,080,038	27.7	8,665,041	2,183,318	77,827,532	35.6	25,759,666

PEAS AND BEANS.

TABLE IX.—Showing by County Municipalities of Ontario, the area, produce and market value of Peas and Beans for the year 1909, together with the totals of the Province for the past five years and the average for the five years, 1905-1909; and the average for the twenty-eight years, 1882-1909.

Countries and Districts.	Peas.				Beans.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	2,228	53,695	24.1	47,627	1	17	17.0	34
Brant	3,202	56,355	17.6	45,366	302	5,768	19.1	8,825
Bruce	34,553	725,613	21.0	606,612	189	3,780	20.0	6,388
Carleton	1,715	37,044	21.6	32,080	440	9,240	21.0	15,800
Dufferin	7,124	150,316	21.1	123,710	22	374	17.0	636
Dundas	665	13,101	19.7	11,411	182	3,640	20.0	5,569
Durham	20,751	352,767	17.0	324,546	447	8,314	18.6	12,804
Elgin	5,494	84,608	15.4	67,940	8,653	167,003	19.3	257,185
Essex	2,331	38,695	16.6	34,826	294	5,880	20.0	10,055
Frontenac	1,856	33,408	18.0	28,798	335	4,757	14.2	8,039
Glengarry	949	15,564	16.4	14,272	146	2,628	18.0	4,073
Grenville	296	5,950	20.1	5,099	245	4,337	17.7	7,720
Grey	31,498	670,907	21.3	568,929	382	6,761	17.7	10,480
Haldimand	8,712	113,256	13.0	90,152	280	4,004	14.3	6,807
Haliburton	733	14,367	19.6	12,643	21	378	18.0	635
Halton	6,371	112,767	17.7	94,048	25	400	16.0	756
Hastings	6,710	131,516	19.6	109,816	337	6,066	18.0	9,827
Huron	26,336	547,789	20 8	454,665	397	7,940	20.0	12,307
Kent	5,038	99,752	19.8	86,186	23,675	430,885	18.2	710,960
Lambton	4,785	83,738	17.5	67,912	864	14,170	16.4	20,688
Lanark	3,180	61,374	19.3	51,861	293	4,688	16.0	7,313
Leeds	692	14,463	20.9	12,077	170	3,281	19.3	5,381
Lennox and Add'ton	4,084	76,371	18.7	65,374	208	4,784	23.0	7,654
Lincoln	2,630	36,557	13.9	31,073	235	4,536	19.3	8,210
Manitoulin	4,448	78,285	17.6	63,724	12	192	16.0	384
Middlesex	8,143	159,603	19.6	129,598	1,110	21,756	19.6	34,157
Muskoka	1,483	34,109	23.0	30,630	16	320	20.0	621
Nipissing	1,474	32,575	22.1	30,002	16	256	16.0	463
Norfolk	5,730	90,534	15.8	70,979	1,890	34,776	18.4	52,860
Northumberland	15,418	282,149	18.3	256,756	713	12,050	16.9	17,473
Ontario	17,204	326,876	19.0	278,825	253	4,630	18.3	7,269
Oxford	5,549	128,182	23.1	107,417	113	2,260	20.0	3,797
Parry Sound	3,033	63,693	21.0	55,668	9	162	18.0	243
Peel	7,026	146,843	20.9	124,817	40	640	16.0	896
Perth	11,342	266,537	23.5	214,829	37	740	20.0	1,428
Peterborough	14,481	304,101	21.0	280,381	107	1,926	18.0	2,773
Prescott	928	16,890	18.2	15,758	207	4,140	20.0	6,624
Prince Edward	6,768	113,026	16.7	95,281	307	5,833	19.0	9,041
Rainy River	68	1,360	20.0	1,258	2	30	15.0	60
Renfrew	14,528	273,126	18.8	225,602	275	4,730	17.2	7,852
Russell	877	17,452	19.9	16,789	142	2,840	20.0	4,743
Simcoe	25,111	585,086	23.3	483,281	287	5,797	20.2	9,623
Stormont	180	3,600	20.0	3,085	72	1,296	18.0	2,164
Sudbury	1,253	26,940	21.5	25,943	13	208	16.0	416
Thunder Bay	78	1,950	25.0	1,755	5	75	15.0	150
Victoria	10,454	198,626	19.0	164,462	73	1,168	16.0	1,752
Waterloo	6,471	137,185	21.2	112,903	82	1,443	17.6	2,626
Welland	2,062	29,899	14.5	24,936	891	11,405	12.8	22,126
Wellington	14,851	335,633	22.6	274,548	7	105	15 0	184
Wentworth	3,448	58,161	17.1	49,204	82	1,435	17.5	2,554
York	17,268	371,262	21.5	312,231	125	2,500	20.0	3,900
The Province:								
1909	381,609	7,613,656	20.0	6,437,685	45,029	826,344	18.4	1,334,325
1908	396,642	7,401,336	18.7	6,121,449	46,477	783,757	16.9	1,160,103
1907	340,977	7,365,036	21.6	5,744,728	47,562	790,269	16.6	1,201,209
1906	410,356	7,388,987	18.0	5,216,625	51,272	950,312	18.5	1,320,934
1905	374,518	7,100,021	19.0	4,636,314	50,543	846,443	16.7	1,117,305
Average (5 years): 1905-1909	380,820	7,373,807	19.4	5,631,360	48,176	839,425	17.4	1,226,775
Average (28 years): 1882-1909	627,534	12,199,959	19.4	7,335,139	42,047	721,741	17.2	827,390

RYE AND BUCKWHEAT.

TABLE X.—Showing by County Municipalities of Ontario, the area, produce and market value of Rye and Buckwheat for the year 1909, together with the totals for the Province for the past five years; the average for the five years, 1905-1909; and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Rye.				Buckwheat.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	68	1,768	26.0	1,344	57	1,100	19.3	696
Brant	4,316	80,278	18.6	55,392	2,460	41,820	17.0	22,792
Bruce	1,087	19,240	17.7	11,544	2,426	59,680	24.6	32,824
Carleton	1,132	21,734	19.2	14,736	4,678	128,645	27.5	66,252
Dufferin	3,150	63,000	20.0	41,328	4,567	111,892	24.5	58,072
Dundas	468	8,518	18.2	6,159	2,016	56,246	27.9	29,642
Durham	6,705	101,246	15.1	69,758	9,700	220,190	22.7	114,719
Elgin	3,095	51,687	16.7	36,646	4,121	69,233	16.8	39,740
Essex	1,782	37,066	20.8	24,315	2,500	67,000	26.8	35,711
Frontenac	2,813	48,665	17.3	32,411	3,549	112,858	31.8	63,426
Glengarry	....	....	......	....	1,694	52,175	30.8	29,531
Grenville	1,328	28,286	21.3	19,800	4,568	131,102	28.7	69,353
Grey	539	8,624	16.0	5,493	3,779	94,475	25.0	50,733
Haldimand	752	11,581	15.4	7,701	1,386	28,552	20.6	16,617
Haliburton	83	1,419	17.1	928	614	14,982	24.4	8,510
Halton	117	1,650	14.1	1,147	333	4,329	13.0	2,563
Hastings	5,652	91,562	16.2	61,896	6,702	164,869	24.6	91,997
Huron	260	4,290	16.5	2,557	3,840	76,800	20.0	41.395
Kent	980	19,894	20.3	13,846	1,232	22,915	18.6	11,847
Lambton	263	5,260	20.0	3,156	447	11,175	25.0	5,588
Lanark	1,573	23,752	28,8	14,441	5,018	144,518	19.3	74,860
Leeds	1,035	18,320	17.7	12,256	3,206	85,280	26.6	48,013
Lennox and Add.	1,766	25,960	14.7	17.237	6,739	174,540	25.9	90.586
Lincoln	937	15,742	16.8	11.334	550	11,000	20.0	6,930
Manitoulin	442	6,630	15.0	5,112	87	2,175	25.0	1,360
Middlesex	777	13,986	18.0	9,091	929	16,258	17.5	9,560
Muskoka	109	1,646	15.1	1,070	214	4,344	20.3	2,737
Nipissing	62	1,023	16.5	921	221	5,525	25.0	3,729
Norfolk	12,333	193,628	15.7	132,829	12,102	229,938	19.0	123,477
Northumberland	11,148	169,450	15.2	114,379	13,344	320,256	24.0	165,893
Ontario	4,983	76,738	15.4	49,880	9,250	226,625	24.5	118,978
Oxford	1,149	20,222	17.6	14 034	2,014	41,287	20.5	23,864
Parry Sound	268	4,181	15.6	2,805	69	1,125	16.3	754
Peel	2,160	35,640	16.5	23,914	2,316	53,731	23.2	28,209
Perth	246	3,936	16.0	2,755	978	24,450	25.0	14,548
Peterborough	1,657	27,838	16.8	17,928	5,575	145,508	26.1	75,664
Prescott	121	1,960	16.2	1,352	1,319	33,766	25.6	19,449
Prince Edward	5,242	82,299	15.7	55,223	5,095	141,641	27.8	73,087
Rainy River	....	....	......	....	....	....	......	....
Renfrew	4,157	71,500	17.2	46,404	2,600	60,060	23.1	31,291
Russell	78	1,404	18.0	983	770	23,870	31.0	13,319
Simcoe	3,669	58,337	15.9	38,794	9,820	226,842	23.1	117,050
Stormont	114	2,052	18.0	1,365	2,480	75,144	30.3	40,202
Sudbury	160	3,200	20.0	2,560	93	1,860	20.0	1,395
Thunder Bay	28	560	20.0	392	....	....	......	....
Victoria	1,214	20,152	16.6	12,293	10,220	282,072	27.6	144,139
Waterloo	1,473	28,429	19.3	20,725	1,065	24,176	22.7	14,288
Welland	834	14,011	16.8	9.640	3,295	49,425	15.0	28,321
Wellington	848	16,960	20.0	11,295	8,873	229,811	25.9	122,719
Wentworth	689	12,058	17.5	8,332	2,337	35,055	15.0	21,313
York	799	16,539	20.7	11,065	5,382	140,470	26.1	76,697
The Province:								
1909	94,661	1,573,921	16.6	1,060,566	176,630	4,280,790	24.2	2,284,440
1908	87,908	1,453,616	16.5	1,012,953	140,605	3,323,668	23.6	1,799,890
1907	67,158	1,039,021	15.5	721,081	113,039	2,546,468	22.5	1,461,673
1906	79,870	1,327,582	16.6	808,497	106,444	1,792,903	16.8	887,487
1905	101,292	1,714,951	16.9	974,092	101,591	2,199,652	21.7	1,099,826
Average (5 years) 1905–1909	86,178	1,421,818	16.5	915,438	127,662	2,828,696	22.2	1,506,663
Average (28 years) 1882–1909	116,372	1,903,964	16.4	1,015,202	104,646	2,100,480	20.0	918,554

CORN.*

TABLE XI.—Showing by County Municipalities of Ontario, the area, produce and market value of Corn for husking and for fodder for the year 1909, together with the totals for the Province for the past five years, the average for the five years 1905-1909; and the average for the eighteen years, 1892-1909, also the average yield.

Counties and Districts.	Corn for husking.				Corn for silo.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Tons (green.)	Per acre.	Market value.
				$				$
Algoma	19	760	40.0	380	188	2,256	12.00	4,512
Brant	5,140	332,044	64.6	159,381	5,622	56,220	10.00	112,440
Bruce	739	35,103	47.5	15,796	7,646	82,806	10.83	165,612
Carleton	869	44,493	51.2	21,312	12,868	189,803	14.75	379,606
Dufferin	158	7,900	50.0	4,187	849	8,915	10.50	17,830
Dundas	3,589	211,033	58.8	109,104	9,275	119,277	12.86	238,554
Durham	1,624	82,824	51.0	37,271	4,464	55,264	12.38	110,528
Elgin	23,963	1,698,977	70.9	788,325	9,903	94,376	9.53	188,752
Essex	80,451	6,130,366	76.2	2,366,321	2,257	13,542	6.00	27,084
Frontenac	3,933	247,386	62.9	120,724	6,884	80,199	11.65	160,398
Glengarry	993	62,063	62.5	32,211	6,696	94,280	14.08	188,560
Grenville	3,890	252,850	65.0	127,184	7,110	97,194	13.67	194,388
Grey	465	18,600	40.0	8,500	8,720	116,848	13.40	233,696
Haldimand	3,456	185,242	53.6	84,656	2,188	20,786	9.50	41,572
Haliburton	130	7,410	57.0	3,831	242	2,662	11.00	5,324
Halton	855	45,315	53.0	23,564	4,433	51,866	11.70	103,732
Hastings	7,330	450,795	61.5	220,439	10,677	119,155	11.16	238,310
Huron	1,573	80,066	50.9	35,149	10,659	150,292	14.10	300,584
Kent	67,585	5,014,807	74.2	1,970,819	5,090	34,867	6.85	69,734
Lambton	21,266	1,597,077	75.1	704,311	9,685	91,330	9.43	182,660
Lanark	1,794	75,527	42.1	40,331	9,000	117,540	13.06	235,080
Leeds	6,027	365,839	60.7	170,847	11,498	136,826	11.90	273,652
Lennox and Add.	3,524	232,584	66.0	114,896	3,690	39,040	10.58	78,080
Lincoln	6,405	464,363	72.5	233,110	2,159	15,869	7.35	31,738
Manitoulin	147	5,880	40.0	2,940	391	4,637	11.86	9,274
Middlesex	16,246	1,179,460	72.6	536,654	16,844	188,821	11.21	377,642
Muskoka	300	10,500	35.0	5,775	510	4,335	8.50	8,670
Nipissing	54	2,160	40.0	1,296	120	1,200	10.00	2,400
Norfolk	16,557	1,221,907	73.8	529,086	5,765	42,373	7.35	84,746
Northumberland	4,025	253,978	63.1	121,148	6,485	72,437	11.17	144,874
Ontario	1,518	68,310	45.0	33,267	7,433	96,257	12.95	192,514
Oxford	9,127	551,271	60.4	282,802	19,893	214,248	10.77	428,496
Parry Sound	108	3,240	30.0	1,782	570	5,318	9.33	10,636
Peel	352	17,600	50.0	7,040	4,540	49,668	10.94	99,336
Perth	522	26,100	50.0	12,424	10,175	129,019	12.68	258,038
Peterborough	578	26,010	45.0	13,395	3,415	36,541	10.70	73,082
Prescott	3,175	222,250	70.0	100,679	2,059	24,564	11.93	49,128
Prince Edward	7,999	491,139	61.4	222,486	5,578	39,604	7.10	79,208
Rainy River	14	420	30.0	210	7	56	8.00	112
Renfrew	966	63,273	65.5	31,637	4,105	55,418	13.50	110,836
Russell	710	51,830	73.0	23,842	4,144	53,416	12.89	106,832
Simcoe	1,569	76,410	48.7	35,378	6,654	89,430	13.44	178,860
Stormont	1,535	94,710	61.7	46,313	6,300	82,467	13.09	164,934
Sudbury	53	2,544	48.0	1,399	....	....	......	....
Thunder Bay	....	....	......	....	....	....	......	....
Victoria	446	22,300	50.0	11,641	3,430	41,606	12.13	83,212
Waterloo	741	38,310	51.7	18,389	6,432	85,546	13.30	171,092
Welland	7,717	380,448	49.3	192,887	1,941	14,033	7.23	28,066
Wellington	260	11,700	45.0	5,499	3,840	45,235	11.78	90,470
Wentworth	1,686	110,096	65.3	53,176	6,076	69,509	11.44	139,018
York	606	44,420	73.3	22,032	9,836	137,704	14.00	275,408
The Province:								
1909	322,789	22,619,690	70.1	9,705,826	288,346	3,374,655	11.70	6,749,310
1908	299,690	23,601,122	78.8	9,440,336	233,753	2,729,265	11.68	5,458,530
1907	338,573	21,899,466	64.7	6,219,448	200,354	2,029,547	10.13	4,059,094
1906	289,456	23,988,682	82.9	9,019,744	180,796	2,149,413	11.89	4,298,826
1905	295,005	20,922,919	70.9	7,720,557	184,784	2,284,812	12.36	4,569,624
Average (5 years). 1905-1909	309,103	22,606,376	73.1	8,421,182	217,607	2,513,538	11.55	5,027,077
Average (18 years) 1892-1909	309,280	21,958,580	71.0	6,775,479	182,047	2,085,672	11.45	4,171,344

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*The combined average for corn for the twenty-eight years, 1882-1909, is 385,809 acres, the average value of the produce for the same period being $8,360,319

POTATOES AND CARROTS.

TABLE XII.—Showing by County Municipalities of Ontario, the area, produce and market value of Potatoes and Carrots for the year 1909, together with the totals for the Province for the past five years, the average for the five years, 1905-1909; and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Potatoes.				Carrots.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Bushels.	Per acre.	Market value.
				$				$
Algoma	1,298	293,348	226	123,206	40	14,680	367	1,835
Brant	3,118	336,744	108	133,351	30	9,000	300	1,125
Bruce	4,405	599,080	136	207,881	169	51,714	306	6,464
Carleton	5,961	1,192,200	200	373,159	140	37,380	267	4,672
Dufferin	3,340	527,720	158	137,207	66	12,408	188	1,551
Dundas	1,915	361,935	189	125,591	12	3,144	262	393
Durham	3,410	518,320	152	170,527	79	25,280	320	3,160
Elgin	3,428	353,084	103	167,715	81	25,677	317	3,210
Essex	3,915	505,035	129	277,264	89	23,229	261	2,904
Frontenac	4,004	652,652	163	185,353	91	31,213	343	3,902
Glengarry	2,635	500,650	190	169,720	49	13,818	282	1,727
Grenville	3,015	551,745	183	190,904	43	11,266	262	1,408
Grey	6,374	815,872	128	273,317	120	30,000	250	3,750
Haldimand	1,976	199,576	101	93,601	30	6,240	208	780
Haliburton	780	138,840	178	48,177	5	1,000	200	125
Halton	1,652	158,592	96	71,208	25	6,250	250	781
Hastings	6,535	1,045,600	160	341,911	69	15,111	219	1,889
Huron	4,726	581,298	123	205,779	77	22,792	296	2,849
Kent	3,983	481,943	121	242,899	83	23,738	286	2,967
Lambton	3,600	453,600	126	214,553	122	43,432	356	5,429
Lanark	2,577	546,324	212	180,287	38	11,400	300	1,425
Leeds	3,102	570,768	184	179,792	73	23,798	326	2,975
Lennox & Adding'n.	3,454	500,830	145	145,742	25	4,500	180	562
Lincoln	2,062	226,820	110	108,874	64	26,432	413	3,304
Manitoulin	756	114,912	152	39,645	23	6,325	275	791
Middlesex	7,056	677,376	96	269,596	131	35,370	270	4,421
Muskoka	1,376	207,776	151	92,876	68	13,600	200	1,700
Nipissing	1,483	298,083	201	157,388	81	29,241	361	3,655
Norfolk	3,723	450,483	121	168,931	65	15,535	239	1,942
Northumberland	4,528	706,368	156	226,744	205	41,000	200	5,125
Ontario	4,262	605,204	142	209,401	44	16,500	375	2,062
Oxford	3,152	315,200	100	152,557	64	16,448	257	2,056
Parry Sound	1,698	249,606	147	119,062	78	20,358	261	2,545
Peel	3,526	423,120	120	151,054	69	22,425	325	2,803
Perth	3,196	450,636	141	176,649	38	8,740	230	1,093
Peterborough	3,093	501,066	162	176,876	41	12,792	312	1,599
Prescott	2,583	524,349	203	154,159	127	34,671	273	4,334
Prince Edward	2,280	275,880	121	95,730	32	9,600	300	1,200
Rainy River	628	144,440	230	68,465	15	3,465	231	433
Renfrew	3,779	804,927	213	242,283	111	32,523	293	4,065
Russell	1,444	336,452	233	109,683	149	42,614	286	5,327
Simcoe	9,558	1,567,512	164	438,903	127	43,307	341	5,413
Stormont	2,105	414,685	197	142,237	52	16,484	317	2,061
Sudbury	1,207	188,292	156	94,146	33	9,900	300	1,238
Thunder Bay	1,013	193,483	191	93,452	64	14,400	225	1,800
Victoria	2,475	425,700	172	140,055	7	2,450	350	306
Waterloo	3,106	347,872	112	157,238	69	20,286	294	2,536
Welland	3,356	255,056	76	138,495	19	2,850	150	356
Wellington	4,456	606,016	136	204,227	41	14,637	357	1,830
Wentworth	5,086	600,148	118	278,469	35	8,330	238	1,041
York	7,505	848,065	113	323,113	98	34,300	350	4,288
The Province:								
1909	169,695	24,645,283	145	8,989,452	3,506	1,001,653	286	125,207
1908	166,974	18,517,642	111	8,874,201	4,080	1,120,145	275	140,018
1907	177,186	20,057,675	113	11,693,625	*4,530	*1,585,500	*350	*198,187
1906	136,064	15,020,299	110	8,080,921	4,980	1,598,698	321	199,837
1905	132,530	14,366,049	108	6,608,383	5,509	1,846,659	335	230,832
Average (5 years): 1905-1909	156,490	18,521,390	118	8,849,316	4,521	1,430,531	316	178,816
Average (28 years): 1882-1909	157,108	18,184,223	111	7,608,188	9,340	3,229,085	346	403,636

*Estimated.

MANGEL-WURZELS AND TURNIPS.

TABLE XIII. Showing by County Municipalities of Ontario, the area, produce and market value of Mangel-Wurzels and Turnips for the year 1909, together with the totals for the Province for the past five years, the average for the five years, 1905-1909, and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Mangel-Wurzels.				Turnips.			
	Acres.	Bushels.	Per Acre.	Market Value.	Acres.	Bushels.	Per Acre.	Market Value.
				$				$
Algoma	67	31,825	475	2,546	575	266,225	463	26,622
Brant	1,455	708,585	487	56,687	2,754	1,244,808	452	124,481
Bruce	4,535	1,623,530	358	129,882	4,103	1,620,685	395	162,069
Carleton	806	373,984	464	29,919	2,602	1,238,552	476	123,855
Dufferin	832	280,384	337	22,430	3,802	1,380,126	363	138,013
Dundas	119	42,721	359	3,418	135	40,500	300	4,050
Durham	2,212	973,280	440	77,862	5,383	2,906,820	540	290,682
Elgin	641	269,861	421	21,589	213	74,763	351	7,476
Essex	707	304,717	431	24,377	97	27,548	284	2,755
Frontenac	423	140,013	331	11,201	455	170,625	375	17,062
Glengarry	164	54,612	333	4,369	598	194,350	325	19,435
Grenville	120	51,960	433	4,157	295	138,650	470	13,865
Grey	3,869	1,330,936	344	106,475	7,530	2,906,580	386	290,658
Haldimand	425	137,275	323	10,982	107	30,281	283	3,028
Haliburton	34	8,500	250	680	269	97,916	364	9,792
Halton	1,733	519,900	300	41,592	1,160	348,000	300	34,800
Hastings	545	212,550	390	17,004	1,657	672,742	406	67,274
Huron	6,863	2,909,912	424	232,793	4,305	2,023,350	470	202,335
Kent	1,005	444,210	442	35,537	245	91,875	375	9,187
Lambton	1,425	628,425	441	50,274	348	153,816	442	15,382
Lanark	495	208,395	421	16,672	1,240	582,800	470	58,280
Leeds	253	102,971	407	8,238	515	217,330	422	21,733
Lennox & Addingt'n	129	37,539	291	3,003	402	98,088	244	9,809
Lincoln	260	124,800	110	9,984	131	72,050	550	7,205
Manitoulin	52	15,600	300	1,248	301	107,758	358	10,776
Middlesex	2,802	1,258,098	449	100,648	1,986	897,672	452	89,767
Muskoka	71	8,875	125	710	574	154,980	270	15,498
Nipissing	33	6,831	207	546	536	207,968	388	20,797
Norfolk	490	183,750	375	14,700	1,030	381,100	370	38,110
Northumberland	1,089	537,966	494	43,037	4,480	2,410,240	538	241,024
Ontario	3,870	1,714,410	443	137,153	11,521	5,242,055	455	524,205
Oxford	2,885	1,246,320	432	99,706	5,365	2,639,580	492	263,958
Parry Sound	26	6,058	233	485	1,192	358,792	301	35,879
Peel	1,513	562,836	372	45,027	1,386	611,226	441	61,123
Perth	5,441	2,453,891	451	196,311	3,650	1,821,350	499	182,135
Peterborough	1,316	538,244	409	43,060	2,534	1,267,000	500	126,700
Prescott	79	27,176	344	2,174	412	189,108	459	18,911
Prince Edward	205	28,290	138	2,263	164	49,200	300	4,920
Rainy River	34	13,192	388	1,055	173	68,854	398	6,885
Renfrew	248	91,016	367	7,281	806	340,938	423	34,094
Russell	301	135,450	450	10,836	706	378,416	536	37,842
Simcoe	2,898	1,179,486	407	94,359	8,192	3,694,592	451	369,459
Stormont	41	21,156	516	1,692	110	50,820	462	5,082
Sudbury	23	6,900	300	552	377	119,509	317	11,951
Thunder Bay	9	2,250	250	180	166	49,800	300	4,980
Victoria	1,472	563,776	383	45,102	5,185	2,545,835	491	254,584
Waterloo	3,840	1,605,120	418	128,409	3,527	1,604,785	455	160,479
Welland	132	31,944	242	2,556	173	32,524	188	3,252
Wellington	4,939	2,020,051	409	161,604	11,261	5,225,104	464	522,510
Wentworth	2,165	811,875	375	64,950	1,835	737,670	402	73,767
York	5,397	2,336,901	433	186,952	6,837	2,953,584	432	295,358
The Province:								
1909	70,488	28,928,347	410	2,314,267	113,400	50,738,940	447	5,073,894
1908	67,937	29,870,966	440	2,389,677	120,920	41,210,189	341	4,121,019
1907	*68,644	*30,260,315	*441	*2,420,825	123,011	48,205,605	392	4,820,561
1906	69,352	32,863,192	474	2,629,055	132,512	57,060,151	431	5,706,015
1905	69,035	33,216,930	481	2,657,354	135,348	57,654,086	426	5,765,409
Average (5 years): 1905-1909	69,091	31,027,950	449	2,482,236	125,038	50,973,794	408	5,097,380
Average (28 years): 1882-1909	41,770	19,059,735	456	1,524,779	126,779	54,439,993	429	5,445,873

*Estimated.

SUGAR BEETS—HAY AND CLOVER.

TABLE XIV.—Showing by County Municipalities of Ontario, the area, produce and market value of Sugar Beets and Hay and Clover for the year 1909, together with the totals for the Province for the past five years; the average for the five years, 1905-1909, and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Sugar Beets.				Hay and Clover.			
	Acres.	Bushels.	Per acre.	Market value.	Acres.	Tons.	Per acre.	Market value.
				$				$
Algoma..........	11	4,543	413	545	17,290	12,103	0.70	209,140
Brant	310	120,280	388	14,434	35,611	56,265	1.58	705,563
Bruce	239	80,543	337	9,665	122,784	142,429	1.16	1,660,722
Carleton	327	108,891	333	13,067	88,702	105,555	1.19	1,378,548
Dufferin	414	120,060	290	14,407	57,233	71,541	1.25	865,646
Dundas	73	21,024	288	2,523	46,044	47,425	1.03	596,132
Durham	198	99,000	500	11,880	55,389	65,913	1.19	897,076
Elgin	421	141,035	335	16,924	72,592	113,244	1.56	1,285,319
Essex	656	188,272	287	22,593	58,439	105,190	1.80	1,011,928
Frontenac	137	44,525	325	5,343	86,702	82,367	0.95	1,147,372
Glengarry	124	31,000	250	3,720	60,196	80,663	1.34	894,553
Grenville	114	42,750	375	5,130	47,680	50,541	1.06	686,852
Grey	613	208,420	340	25,010	156,654	187,985	1.20	2,592,313
Haldimand	45	12,600	280	1,512	73,002	93,443	1.28	998,906
Haliburton.......	10	2,500	250	300	13,510	7,836	0.58	130,078
Halton	110	27,500	250	3,300	38,345	49,465	1.29	673,219
Hastings	69	19,320	280	2,318	96,807	102,615	1.06	1,462,264
Huron	317	112,852	356	13,542	125,287	146,586	1.17	1,761,964
Kent	5,267	1,906,654	362	228,798	79,582	134,494	1.69	1,437,741
Lambton	2,024	761,024	376	91,323	98,150	130,540	1.33	1,476,407
Lanark	212	95,400	450	11,448	62,983	40,309	0.64	602,620
Leeds	104	39,000	375	4,680	66,540	57,890	0.87	902,505
Lennox and Add..	62	14,508	234	1,741	81,062	63,228	0.78	815,641
Lincoln..........	205	97,580	476	11,710	47,121	57,016	1.21	750,331
Manitoulin.......	35	7,875	225	945	18,216	9,108	0.50	149,827
Middlesex	555	228,105	411	27,373	122,641	172,924	1.41	2,170,196
Muskoka	26	3,458	133	415	27,009	27,549	1.02	470,261
Nipissing	33	9,900	300	1,188	16,661	20,160	1.21	332,640
Norfolk..........	270	85,590	317	10,271	55,927	78,298	1.40	915,304
Northumberland..	182	81,900	450	9,828	68,215	77,765	1.14	1,084,044
Ontario	215	78,475	365	9,417	69,144	82,281	1.19	1,103,388
Oxford	736	250,240	340	30,029	75,935	116,940	1.54	1,555,302
Parry Sound.....	19	3,800	200	456	31,015	24,192	0.78	395,781
Peel.............	310	108,500	350	13,020	55,632	70,653	1.27	1,001,860
Perth	416	104,000	250	12,480	96,551	145,792	1.51	1,678,066
Peterborough	132	39,600	300	4,752	54,546	44,728	0.82	702,677
Prescott	64	24.768	387	2,972	69 121	100,225	1.45	1,058,376
Prince Edward ..	64	10,688	167	1,283	47,326	61,524	1.30	824,422
Rainy River......	11	3,575	325	429	13,711	16,727	1.22	225,815
Renfrew	90	26,370	293	3,164	91,620	71,464	0.78	986,918
Russell..........	37	12,839	347	1,541	42,020	57,147	1.36	633,189
Simcoe	878	308,178	351	36,981	107,458	112,831	1.05	1,619,125
Stormont	49	19,600	400	2,352	39,180	46,232	1.18	541,839
Sudbury	4	1,000	250	120	18,253	18,253	1.00	292,048
Thunder Bay	....	....	.....	....	5,412	3,410	0.63	56,538
Victoria	40	10,000	250	1,200	53,620	52,548	0.98	739,350
Waterloo	1,421	426,300	300	51,156	47,909	79,050	1.65	974,687
Welland	95	28,025	295	3,363	57,776	62,398	1.08	856,101
Wellington	811	325,211	401	39,025	114,903	145,927	1.27	1,737,991
Wentworth	367	125,147	341	15,018	48,328	64,760	1.34	937,725
York	890	379,140	426	45,497	92,611	117,616	1.27	1,767,768
The Province:								
1909.........	19,812	7,001,565	353	840,188	3,228,445	3,885,145	1.20	49,754,078
1908.........	17,453	7,004,748	401	840,570	3,253,141	4,635,287	1.42	47,696,579
1907.........	*16,851	*8,237,044	*489	*988,445	3,289,552	3,891,863	1.18	58,806,050
1906.........	....	....	.....	....	3,069,917	4,684,625	1.53	42,630,087
1905.........	....	....	.....	....	3,020,365	5,847,494	1.94	45,142,654
Average (5 years) 1905–1909....	18,039	7,414,452	411	889,734	3,172,284	4,588,883	1.45	48,805,890
Average (28 years) 1882–1909....	....	....	.....	....	2,583,220	3,751,119	1.45	34,731,675

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* Estimated.

The average for Sugar Beets are only for three years, 1907-1909. No data previous to 1907.

ALL FIELD CROPS—ORCHARD AND VINEYARD.

TABLE XV.—Showing by County Municipalities for 1909 the aggregate area, the market value and the value per acre of all field crops enumerated in Tables VII and XIV, also the area in orchard, small fruits and vineyard.

Counties and Districts.	All Field Crops.			Orchard.	Small fruits.	Vineyard.	Garden.
	Acres.	Value.	Per acre.	Acres.	Acres.	Acres.	Acres.
		$	$				
Algoma	32,131	604,375	18.81	333	106	8	559
Brant	126,389	2,550,499	20.18	4,642	488	64	1,085
Bruce	342,590	5,435,514	15.87	9,055	505	31	1,419
Carleton	231,513	4,123,608	17.81	3,052	435	26	1,247
Dufferin	173,556	2,752,101	15.85	2,440	114	17	658
Dundas	103,498	1,786,457	17.26	2,408	102	55	513
Durham	196,731	3,327,312	16.91	9,712	340	132	1,013
Elgin	215,201	4,249,310	19.75	9,839	694	43	1,911
Essex	250,855	5,182,141	20.66	9,026	947	725	2,230
Frontenac	166,913	2,449,426	14.67	3,313	223	42	1,235
Glengarry	125,849	2,043,273	16.23	1,586	76	17	551
Grenville	105,834	1,912,628	18.07	1,780	52	9	625
Grey	419,560	7,067,638	16.85	14,706	338	160	1,607
Haldimand	165,232	2,310,126	13.98	5,743	330	102	1,285
Haliburton	24,832	332,342	13.38	307	10	10	317
Halton	109,636	1,887,764	17.22	7,841	2,251	393	883
Hastings	247,432	4,058,997	16.40	10,153	276	47	1,735
Huron	375,174	6,338,923	16.90	12,972	460	86	1,425
Kent	345,937	7,532,060	21.77	11,390	1,442	155	2,057
Lambton	283,873	4,642,847	16.36	11,521	1,221	121	2,042
Lanark	148,271	2,126,932	14.34	2,094	79	9	899
Leeds	146,461	2,354,096	16.07	2,480	134	37	911
Lennox & Addington	162,710	2,100,036	12.91	5,186	267	6	1,378
Lincoln	100,860	1,726,416	17.12	13,390	1,935	4,844	824
Manitoulin	34,358	444,163	12.93	437	12	6	232
Middlesex	353,100	6,378,183	18,06	14,769	1,270	137	2,789
Muskoka	45,355	822,060	18.12	490	38	16	725
Nipissing	30,509	739,657	24.24	57	31	23	593
Norfolk	184,182	3,335,523	18.11	10,065	828	190	1,445
Northumberland	215,398	3,644,827	16.92	18,244	641	80	1,366
Ontario	256,878	4,699,573	18.29	7,879	336	32	1,174
Oxford	246,379	5,250,268	21.31	9,361	880	43	1,654
Parry Sound	55,974	868,333	15.51	227	42	7	620
Peel	173,491	2,987,096	17.21	5,508	884	163	726
Perth	286,036	5,536,038	19.35	6,505	237	25	1,147
Peterborough	166,359	2,620,239	15.75	3,145	194	75	1,175
Prescott	139,499	2,195,261	15.74	1,042	111	20	1,358
Prince Edward	122,598	1,983,893	16.18	12,022	870	34	987
Rainy River	20,410	427,331	20.93	5	41	11	315
Renfrew	227,197	3,070,515	13.51	1,186	118	9	1,543
Russell	86,798	1,477,709	16.81	571	107	35	481
Simcoe	453,094	7,841,860	17.31	10,358	775	114	2,555
Stormont	84,448	1,458,680	17.27	1,778	86	15	506
Sudbury	29,263	545,272	18.63	20	27	....	333
Thunder Bay	9,446	206,634	21.88	18	11	5	127
Victoria	185,284	2,972,054	16.05	2,652	105	29	792
Waterloo	178,156	3,795,206	21.30	4,596	263	23	592
Welland	123,630	1,897,220	15.35	7,330	1,083	1,499	1,192
Wellington	323,190	5,686,991	17.60	6,386	390	64	1,127
Wentworth	140,687	2,765,042	19.65	11,015	1,923	1,606	1,671
York	331,036	6,596,932	19.93	9,729	486	20	1,489
The Province:							
1909	9,103,793	159,141,381	17.48	300,364	24,614	11,420	57,123
1908	9,165,634	155,632,389	16.98	326,550	....	11.705	....
1907	9,307,515	168,543,378	18.11	*326,290	....	....	....
1906	8,962,925	144,570,075	16.13	352,306	....	12,785	....
1905	8,897,898	142,804,431	16.05	366,613	....	13,719	....
Average (5 years): 1905-1909	9,087,553	154,138,331	16.96	....	....	....	....
Average (28 years).. 1882-1909	8,273,025	121,836,786	14.73	....	....	....	....

*Including Vineyard and small fruits.

NOTE.—Orchard, small fruits, Vineyard, Garden and Mixed Grains not included in All Field Crops.

SUMMER FALLOW, PASTURE AND MIXED GRAINS.

TABLE XVI.—Showing by County Municipalities of Ontario, the area of summer fallow for the year 1909, the area of pasture for 1909 and the three previous years (except 1907,) the area, produce and market value of mixed grains for the year 1909 and the past two years and the average for the three years, 1907-1909.

Counties and Districts.	Summer fallow. Acres.	Pasture. Acres.	Mixed Grains.			
			Acres.	Bushels.	Per acre.	Value.
						$
Algoma	426	5,761	863	31,845	36.9	21,941
Brant	4,583	26,629	6,648	208,082	56.9	118,399
Bruce	11,718	138,296	15,255	540,027	35.4	282,974
Carleton	1,283	85,538	12,180	505,470	45.6	230,494
Dufferin	3,626	49,720	8,237	302,298	36.7	143,894
Dundas	158	45,274	9,925	397,000	40.0	188,972
Durham	4,609	54,324	16,485	548,951	33.3	287,101
Elgin	6,002	82,315	10,744	304,055	28.3	176,352
Essex	2,764	42,745	6,988	250,869	35.9	116,152
Frontenac	520	93,257	8,399	275,487	32.8	160,333
Glengarry	380	49,854	5,998	164,945	27.5	77,524
Grenville	1,440	54,249	4,580	180,452	39.4	93,835
Grey	9,788	166,886	21,200	739,880	34.9	415,813
Haldimand	11,147	34,305	5,316	125,989	23.7	74,837
Haliburton	83	11,938	785	23,629	30.1	14,579
Halton	4,917	25,250	9,303	280,020	30.1	165,772
Hastings	3,146	131,151	8,076	252,779	31.3	159,504
Huron	9,617	180,570	23,659	882,481	37.3	469,480
Kent	4,303	76,307	8,984	266,825	29.7	156,359
Lambton	6,082	121,542	14,317	415,193	29.0	237,490
Lanark	1,445	118,511	9,612	330,653	34.4	168,964
Leeds	1,395	90,923	7,776	252,720	32.5	144,809
Lennox and Addington	3,105	70,809	6,840	176,472	25.8	101,648
Lincoln	5,731	21,379	2,974	75,540	25.4	46,608
Manitoulin	219	7,160	1,533	49,823	32.5	33,631
Middlesex	8,348	226,916	18,483	567,428	30.7	290,523
Muskoka	421	13,816	982	29,067	29.6	16,859
Nipissing	1,732	7,010	1,043	33,898	32.5	22,881
Norfolk	10,413	40,308	5,745	162,009	28.2	84,893
Northumberland	3,465	74,192	11,813	362,659	30.7	204,902
Ontario	2,321	59,620	19,435	709,378	36.5	402,927
Oxford	4,801	91,022	16,228	584,208	36.0	327,156
Parry Sound	786	16,885	1,171	31,851	27.2	20,703
Peel	6,348	53,775	5,532	172,598	31.2	107,874
Perth	9,988	104,526	18,755	752,076	40.1	407,625
Peterborough	3,630	62,326	4,720	143,488	30.4	81,932
Prescott	....	45,236	3,067	89,556	29.2	46,032
Prince Edward	1,884	42,833	3,840	104,064	27.1	59,629
Rainy River	653	3,788	129	5,031	39.0	3,436
Renfrew	2,240	87,533	8,462	221,704	26.2	111,739
Russell	733	26,986	3,832	150,214	39.2	77,210
Simcoe	31,242	101,579	17,793	578,273	32.5	320,363
Stormont	130	39,670	4,800	179,040	37.3	92,922
Sudbury	293	7,547	995	37,114	37.3	23,493
Thunder Bay	248	612	37	1,332	36.0	932
Victoria	3,194	61,412	10,362	370,960	35.8	190,302
Waterloo	8,356	30,741	20.809	780,338	37.5	434,648
Welland	8,471	31,509	3,604	72,080	20.0	42,527
Wellington	4,512	86,697	39,640	1,522,176	38.4	800,665
Wentworth	4,485	28,482	7,126	228,032	32.0	142,520
York	14,526	51,066	19,450	729,375	37.5	423,038
The Province:						
1909	231,707	3,180,780	474,530	16,199,434	34.1	8,825,196
1908	....	3,326,169	456,049	15,354,350	33.7	8,444,893
1907	....	*	443,100	14,202,511	32.1	7,811,381
1906	....	3,349,101	....	....	......	....
1905	....	3,291,235	....	....	......	....
Average (3 years) 1907-1909	....	....	457,893	15,252,098	33.3	8,360,490

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*Statistics for pasture not taken in 1907.

RATIOS OF AREAS UNDER CROP.

TABLE XVII.—Showing by County Municipalities of Ontario the number of acres under the various crops in 1909 per 1,000 acres of cleared land; together with the average for the Province for the past five years, 1905-1909, and the average of the twenty-eight years, 1882-1909.

Counties and Districts.	Fall Wheat.	Spring Wheat.	Barley.	Oats.	Peas.	Beans.	Rye.	Buck-wheat.	Corn.	Potatoes.	*Other roots.	Hay and Clover.	Mixed Grains.
Algoma	3.4	16.7	35.3	185.8	52.2	....	1.6	1.3	4.9	30.4	16.2	405.3	0.22
Brant	129.4	....	61.0	157.6	18.0	1.7	24.2	13.8	60.4	17.5	25.5	199.7	37.3
Bruce	59.8	4.1	36.6	186.6	62.1	.3	2.0	4.4	15.1	7.9	16.3	220.7	27.4
Carleton	.1	10.3	27.9	282.2	4.9	1.3	3.2	13.5	39.6	17.2	11.1	255.5	35.1
Dufferin	15.0	8.9	82.5	247.4	27.4	.1	12.1	17.6	3.9	12.8	19.7	220.1	31.7
Dundas	.9	.5	22.7	203.7	3.9	1.1	2.7	11.8	75.2	11.2	2.0	269.1	58.0
Durham	16.2	28.9	66.0	174.9	68.7	1.5	22.2	32.1	20.2	11.3	26.1	183.4	54.6
Elgin	71.0	.3	26.7	139.1	15.8	24.9	8.9	11.8	97.2	9.9	3.9	208.4	30.8
Essex	49.3	1.9	31.9	213.7	7.1	.9	5.4	7.6	252.1	11.9	4.7	178.2	21.3
Frontenac	2.5	4.9	17.9	170.3	6.5	1.2	9.9	12.4	37.9	14.0	3.9	304.1	29.5
Glengarry	.5	9.9	32.0	218.7	4.8	.7	....	8.6	38.9	13.3	4.7	304.5	30.3
Grenville	.7	2.3	14.3	184.0	1.6	1.3	7.2	24.8	59.6	16.3	3.1	258.4	24.8
Grey	32.8	7.7	47.0	198.4	45.3	.5	.8	5.4	13.2	9.2	17.4	225.0	30.5
Haldimand	115.5	1.0	32.6	155.2	36.4	1.2	3.1	5.8	23.6	8.3	2.5	304.8	22.2
Haliburton	......	11.1	20.9	158.3	16.6	.5	1.9	13.9	8.4	17.7	7.2	306.0	17.8
Halton	100.6	4.4	53.9	153.9	36.6	.1	.7	1.9	30.3	9.5	17.4	220.2	53.4
Hastings	6.8	6.3	44.7	182.3	15.4	.8	13.0	15.4	41.4	15.0	5.4	222.8	18.6
Huron	51.6	3.6	50.4	186.5	40.4	.6	.4	5.9	18.8	7.2	17.7	192.1	36.3
Kent	110.3	.7	60.9	157.0	10.9	51.2	2.1	2.7	157.1	8.6	14.3	172.0	19.4
Lambton	60.4	.9	51.2	188.0	10.2	1.8	.6	1.0	66.0	7.7	8.3	209.4	30.5
Lanark	2.2	19.3	18.3	143.4	9.7	.9	4.8	15.4	33.0	7.9	6.1	192.8	29.4
Leeds	4.3	2.7	15.3	178.7	2.6	.6	3.9	12.1	66.2	11.7	3.6	251.1	29.3
Lennox & Add	6.8	14.2	36.0	159.8	15.4	.8	6.6	25.4	27.2	13.0	2.3	305.2	25.8
Lincoln	72.1	.9	19.0	143.2	16.2	1.5	5.8	3.4	52.9	12.7	4.1	290.9	18.4
Manitoulin	12.2	17.7	35.2	148.8	100.7	.3	10.0	2.0	12.2	17.1	9.3	412.4	34.7
Middlesex	68.5	.3	34.5	160.4	12.4	1.7	1.2	1.4	50 2	10.7	8.3	186.0	28.0
Muskoka	.4	5.7	6.8	196.2	22.8	.2	1.7	3.3	12.4	21.2	11.4	415.2	15.1
Nipissing	4.0	11.3	16.2	170.3	30.6	.3	1.3	4.6	3.6	30.8	14.2	345.7	21.6
Norfolk	101.6	.2	20.3	128.4	21.0	6.9	45.2	44.4	81.9	13.7	6.8	205.1	21.1
Northumberland	25.8	9.3	43.7	171.1	45.0	2.1	32.6	39.0	30.7	13.2	17.4	199.2	34.5
Ontario	34.2	29.4	82.9	198.5	46.7	.7	13.5	25 1	24.3	11.6	42.5	187.6	52.7
Oxford	66.0	.2	45.0	193.1	14.0	.3	2.9	5.1	73.3	8.0	22.9	191.9	41.0
Parry Sound	.3	5.6	11.4	199.5	36.8	.1	3.2	.8	8.2	20.6	15.9	375.8	14.2
Peel	48.5	10.9	113.5	187.1	26.7	.2	8.2	8.8	18.6	13.4	12.5	211.6	21.0
Perth	65.6	1.7	64.8	213.2	25.5	.1	.6	2.2	24.1	7.2	21.5	217.3	42.2
Peterborough	36.5	9.5	41.0	224.8	57.3	.4	6.6	22.0	15.8	12.2	15.9	215.6	18.7
Prescott	.3	19.0	29.1	237.7	4.5	1.0	.6	6.4	25.3	12.5	3.3	333.6	14.8
Prince Edward	9.3	6.3	68.8	128.2	34.6	1.6	26.8	26.1	69.5	11.7	2.4	242.2	19.7
Rainy River	6.1	18.9	39.1	153.5	2.6	.1	....	....	.8	23.8	8.8	519.2	4.9
Renfrew	1.2	86.0	12.7	199.9	41.9	.8	12.0	7.5	14.6	10.9	3.6	264.4	24.4
Russell	.1	13.4	27.9	234.7	6.8	1.1	.6	6.0	37.8	11.3	9.3	327.6	29.9
Simcoe	97.1	12.2	101.0	211.1	38.2	.4	5.6	14.9	12.5	14.6	18.4	163.6	27.1
Stormont	.1	4.5	22.7	190.0	1.2	.5	.8	16.7	52.9	14.2	1.7	264.3	32.4
Sudbury	4.4	6.7	31.2	173.8	34.7	.4	4.4	2.6	1.5	33.5	12.1	506.0	27.6
Thunder Bay	.....	11.3	43.5	171.8	6.6	.4	2.4	....	.....	86.0	20.3	459.2	3.1
Victoria	24.6	22.6	69.3	223.8	36.8	.3	4.3	36.0	13.6	8.7	23.6	188.8	36.5
Waterloo	123.6	.7	70.0	210.9	25.7	.3	5.8	4.2	28.5	12.3	35.2	190.2	82.6
Welland	96.1	.4	14.9	132.9	11.1	4.8	4.5	17.8	52.0	18.1	2.3	311.3	19.4
Wellington	23.0	10.2	66.8	218.8	29.9	.1	1.7	17.9	8.3	9.0	34.4	231.7	79.9
Wentworth	96.2	1.3	55.3	167.3	16.1	.4	3.2	10.9	36.2	23.7	20.6	225.6	33.3
York	68.6	19.2	106.1	225.7	39.4	.3	1.8	12.3	23.8	17.2	30.2	211.5	44.4
The Province:													
1909	46.5	9.5	48.8	189.0	26.7	3.2	6.6	12.4	42.9	11.9	14.5	226.5	33.3
1908	48.1	10.1	51.9	196.3	28.1	3.3	6.2	9.9	37.7	11.8	14.9	230.2	32.3
1907	47.9	10.2	54.3	207.7	24.1	3.4	4.8	8.0	38.2	12.6	15.1	233.0	31.4
1906	55.8	12.2	53.6	192.6	29.1	3.6	5.7	7.5	33.3	9.7	14.7	217.6	.....
1905	57.2	13.6	55.5	191.5	26.9	3.6	7.3	7.3	34.4	9.5	15.1	216.8	.....
Average (5 yrs) 1905-1909	51.1	11.1	52.8	195.4	27.0	3.4	6.1	9.0	37.3	11.1	15.4	224.8	32.3
Average (28yrs) 1832-1909	68.6	30.8	52.4	175.0	50.3	3.4	9.3	8.4	30.9	12.6	14.3	207.0	.....

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*This includes Carrots, Mangols, Turnips and Sugar Beets.

MARKET PRICES.

TABLE XVIII.—The following table shows by counties the average prices of agricultural products for 1909; together with the average price for the past five years, and the average for the twenty-eight years, 1882-1909.

Counties and Districts.	Fall Wheat, per bush.	Spring Wheat, per bush.	Barley, per bush.	Oats, per bush.	Peas, per bush.	Beans, per bush.	Rye, per bush.	Buckwheat, per bush.	Corn(in ear) per bush.	Hay, per ton.	Potatoes, per bush.
	cts.	cts.	cts.	cts.	cts.	$ c.	cts.	cts.	cts.	$ c.	cts.
Algoma	105.0	103.0	66.4	52.3	88.7	2 00	76.0	63.3	50.0	17 28	42.0
Brant	103.0	......	58.0	41.8	80.5	1 53	69.0	54.5	48.0	12 54	39.6
Bruce	102.0	99.5	52.0	37.2	83.6	1 69	60.0	55.0	45.0	11 66	34.7
Carleton	105.0	101.0	54.5	38.1	86.6	1 71	67.8	51.5	47.9	13 06	31.3
Dufferin	104.0	100.0	51.6	36.8	82.3	1 70	65.6	51.9	50.0	12 10	26.0
Dundas	104.0	103.0	56.0	41.3	87.1	1 53	72.3	52.7	51.7	12 57	34.7
Durham	103.0	100.0	55.6	38.6	92.0	1 54	68.9	52.1	45.0	13 61	32.9
Elgin	102.0	100.0	60.3	45.2	80.3	1 54	70.9	57.4	46.4	11 35	47.5
Essex	99.8	100.0	52.4	37.2	90.0	1 71	65.6	53.3	38.6	9 62	54.9
Frontenac	100.0	100.0	56.5	42.1	86.2	1 69	66.6	56.2	48.8	13 93	28.4
Glengarry	100.0	103.0	56.3	37.9	91.7	1 55	......	56.6	51.9	11 09	33.9
Grenville	103.0	101.0	60.9	42.2	85.7	1 78	70.0	52.9	50.3	13 59	34.6
Grey	101.0	98.1	51.5	38.2	84.8	1 55	63.7	53.7	45.7	13 79	33.5
Haldimand	102.0	97.9	57.2	41.9	79.6	1 70	66.5	58.2	45.7	10 69	46.9
Haliburton	......	97.6	59.1	43.1	88.0	1 68	65.4	56.8	51.7	16 60	34.7
Halton	105.0	101.0	58.5	41.9	83.4	1 89	69.5	59.2	52.0	13 61	44.9
Hastings	98.6	97.5	59.6	41.8	83.5	1 62	67.6	55.8	48.9	14 25	32.7
Huron	102.0	98.1	51.4	36.9	83.0	1 55	59.6	53.9	43.9	12 02	35.4
Kent	102.0	100.0	54.5	39.3	86.4	1 65	69.6	51.7	39.3	10 69	50.4
Lambton	102.0	103.0	52.1	37.0	81.1	1 46	60.0	50.0	44.1	11 31	47.3
Lanark	102.0	101.0	54.9	40.7	84.5	1 56	60.8	51.8	53.4	14 95	33.0
Leeds	107.0	106.0	59.4	43.2	83.5	1 64	66.9	56.3	46.7	15 59	31.5
Lennox and Add	100.0	100.0	58.0	42.2	85.6	1 60	66.4	51.9	49.4	12 90	29.1
Lincoln	104.0	101.0	60.4	42.5	85.0	1 81	72.0	63.0	50.2	13 16	48.0
Manitoulin	103.0	104.0	63.0	54.8	81.4	2 00	77.1	62.5	50.0	16 45	34.5
Middlesex	102.0	98.0	54.4	39.5	81.2	1 57	65.0	58.8	45.5	12 55	39.8
Muskoka	100.0	102.0	65.0	44.4	89.8	1 94	65.0	63.0	55.0	17 07	44.7
Nipissing	107.0	105.0	67.0	48.1	92.1	1 81	90.0	67.5	60.0	16 50	52.8
Norfolk	101.0	97.0	55.5	42.1	78.4	1 52	68.6	53.7	43.3	11 69	37.5
Northumberland	103.0	101.0	56.5	39.7	91.0	1 45	67.5	51.8	47.7	13 94	32.1
Ontario	103.0	101.0	54.2	39.1	85.3	1 57	65.0	52.5	48.7	13 41	34.6
Oxford	103.0	101.0	56.2	42.5	83.8	1 68	69.4	57.8	51.3	13 30	48.4
Parry Sound	104.0	103.0	65.6	48.0	87.4	1 50	67.1	67.0	55.0	16 36	47.7
Peel	103.0	99.6	58.9	41.0	85.0	1 40	67.1	52.5	40.0	14 18	35.7
Perth	103.0	97.5	51.7	37.6	80.6	1 93	70.0	59.5	47.6	11 51	39.2
Peterborough	102.0	99.1	54.6	38.3	92.2	1 44	64.4	52.0	51.5	15 71	35.3
Prescott	100.0	102.0	58.8	39.2	93.3	1 60	69.0	57.6	45.3	10 56	29.4
Prince Edward	98.7	98.2	56.6	42.3	84.3	1 55	67.1	51.6	45.3	13 40	34.7
Rainy River	105.0	100.0	62.5	46.3	92.5	2 00	......	......	50.0	13 50	47.4
Renfrew	102.0	103.0	54.2	36.8	82.6	1 66	64.9	52.1	50.0	13 81	30.1
Russell	100.0	102.0	57.2	37.1	96.2	1 67	70.0	55.8	46.0	11 08	32.6
Simcoe	102.0	100.0	52.2	37.3	82.6	1 66	66.5	51.6	46.3	14 35	28.0
Stormont	100.0	105.0	56.2	39.9	85.7	1 67	66.5	53.5	48.9	11 72	34.3
Sudbury	105.0	107.0	65.0	50.0	96.3	2 00	80.0	75.0	55.0	16 00	50.0
Thunder Bay	......	105.0	70.0	42.3	90.0	2 00	70.0	......	......	16 58	48.3
Victoria	101.0	96.0	52.5	37.1	82.8	1 50	61.0	51.1	52.2	14 07	32.9
Waterloo	102.0	103.0	54.5	42.0	82.3	1 82	72.9	59.1	48.0	12 33	45.2
Welland	103.0	104.0	60.7	44.4	83.4	1 94	68.8	57.3	50.7	13 72	54.3
Wellington	101.0	96.0	54.8	37.4	81.8	1 75	66.6	53.4	47.0	11 91	33.7
Wentworth	104.0	102.0	58.4	42.1	84.6	1 78	69.1	60.8	48.3	14 48	46.4
York	104.0	101.0	58.2	41.4	84.1	1 56	66.9	54.6	49.6	15 03	38.1
The Province:											
1909	102.3	100.6	54.8	39.5	84.6	1 61	67.4	53.4	42.9	12 81	36.5
1908	89.2	90.8	52.4	40.3	82.7	1 48	69.7	54.2	40.0	10 25	47.9
1907	92.7	86.4	59.4	48.8	78.0	1 52	69.4	57.4	28.4	15 11	58.3
1906	70.7	68.9	45.0	34.0	70.6	1 39	60.9	49.5	37.6	9 10	53.8
1905	76.5	74.9	42.9	33.6	65.3	1 32	56.8	50.0	36.9	7 72	46.0
Average (5 years) 1905-1909	80.8	82.3	50.4	38.8	76.4	1 46	64.4	53.3	37.3	10 64	47.8
Average (28 years) 1882-1909	79.8	81.0	47.9	33.1	60.1	1 15	53.3	43.7	*30.9	9 26	41.8

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*Average for eighteen years, 1892-1909.

HORSES AND

TABLE XIX.—Showing by County Municipalities the number and value of Horses and Cattle
June 30th, 1909, together with the totals

Counties and Districts.	Horses all ages.				Cattle	
	Number on hand.	Value.	Horses sold.		Milch cows on hand.	
			Number.	Value.	Number	Value.
		$		$		$
Algoma	2,797	366,407	122	12,200	3,853	149,265
Brant	9,900	1,158,300	599	71,880	14,490	602,060
Bruce	26,771	3,346,375	3,483	477,171	27,014	1,058,679
Carleton	17,313	2,337,255	1,540	212,520	36,890	1,384,851
Dufferin	12,619	1,501,661	1,214	150,536	12,848	498,759
Dundas	8,165	930,810	815	92,910	27,085	1,050,356
Durham	14,507	1,827,882	1,171	149,888	16,698	663,579
Elgin	18,981	2,391,606	1,881	229,482	28,882	1,226,041
Essex	22,372	2,550,408	2,587	341,484	19,718	706,102
Frontenac	12,116	1,296,412	1,271	133,455	31,818	1,066,539
Glengarry	9,432	1,009,224	1,039	129,875	30,222	1,034,499
Grenville	7,212	786,108	562	57,324	20,480	695,910
Grey	31,807	3,880,454	3,500	451,900	37,253	1,401,458
Haldimand	12,850	1,516,300	1,326	176,358	14,751	585,615
Haliburton	1,706	197,896	250	25,750	2,933	84,852
Halton	9,233	1,191,057	980	125,440	11,725	502,768
Hastings	18,568	2,023,912	1,871	205,810	44,470	1,468,844
Huron	33,453	4,415,796	4,779	678,618	29,780	1,259,694
Kent	29,075	3,285,475	2,787	320,505	23,754	945,884
Lambton	24,743	2,845,445	3,059	388,493	26,752	1,067,405
Lanark	11,740	1,420,540	1,176	142,296	25,417	871,041
Leeds	11,141	1,136,382	945	103,005	32,580	1,125,965
Lennox & Addington	11,610	1,137,780	1,275	135,150	24,231	761,096
Lincoln	9,148	1,097,760	808	96,960	9,602	365,836
Manitoulin	2,472	284,280	253	28,336	3,173	113,530
Middlesex	34,710	4,165,200	4,155	548,460	49,810	2,088,035
Muskoka	3,501	441,126	331	37,734	5,827	194,680
Nipissing	2,246	296,472	239	26,768	3,328	124,035
Norfolk	14,867	1,665,104	1,498	184,254	19,613	761,769
Northumberland	17,395	1,983,030	1,795	210,015	26,390	951,623
Ontario	20,592	2,676,960	2,515	349,585	21.956	945,206
Oxford	21,127	2,556,367	2,059	261,493	47,328	2,119,821
Parry Sound	3,712	456,576	374	40,392	5,832	195,839
Peel	13,996	1,847,472	1,878	262,920	16,286	712,675
Perth	25,260	3,233,280	2,457	346,437	35,862	1,475,721
Peterborough	12,080	1,401,280	1,095	142,350	20,690	749,392
Prescott	8,817	987,504	644	80,500	23,643	723,949
Prince Edward	9,719	1,001,057	1,092	134,316	16,461	648,399
Rainy River	1,537	221,328	238	37,604	1,999	77,601
Renfrew	13,624	1,689,376	1,493	188,118	24,183	688,490
Russell	6,473	783,233	622	83,348	17,432	539,520
Simcoe	35,553	4,550,784	3,130	413,160	36,649	1,348,317
Stormont	7,378	782,068	586	63,874	23,165	805,215
Sudbury	1,667	225,045	213	23,856	2,307	85,682
Thunder Bay	644	101,108	37	4,736	957	45,936
Victoria	14,256	1,682,208	2,059	265,611	17,953	654,028
Waterloo	14,315	1,717,800	1,540	203,280	16,701	700,273
Welland	9,672	1,141,296	804	100,500	10,571	410,261
Wellington	25,710	3,110,910	2,561	345,735	26,880	1,255 296
Wentworth	13,380	1,605,600	860	104,920	15,147	619,967
York	26,346	3,424,980	2,893	428,164	32,107	1,465,363
The Province:						
1909	728,308	87,682,689	76,461	9,825,476	1,075,496	41,077,721
1908	726,471	85,847,391	71,214	8,878,225	1,113,374	41,083,586
1907	725,666	85,041,144	*	*	1,152,071	41,970,012
1906	688,147	79,814,953	64,761	7,851,480	1,129,047	40,634,401
1905	672,781	73,911,177	62,588	7,419,783	1,106,984	38,810,859

*No taken in 1907.

CATTLE.

on hand July 1, 1909, and the number and value of those sold or slaughtered in the year ending for the Province for the past five years.

Cattle.						Counties and Districts.
Other cattle on hand.		Total on hand.		Sold or slaughtered.		
Number.	Value.	Number.	Value.	Number.	Value.	
	$		$		$	
5,563	93,292	9,416	242,557	2,478	58,828	Algoma.
17,687	353,033	32,177	955,093	9,716	312,272	Brant.
77,891	1,891,193	104,905	2,949,872	36,167	1,471,635	Bruce.
40,272	792,956	77,162	2,177,807	19,717	620,100	Carleton.
33,616	662,908	46,464	1,161,667	15,435	581,282	Dufferin.
12,600	218,358	39,685	1,268,714	5,875	141,705	Dundas.
33,188	629,576	49,886	1,293,155	12,599	479,266	Durham.
38,660	883,768	67,542	2,109,809	24,008	890,697	Elgin.
30,134	566,218	49,852	1,272,320	15,422	440,144	Essex.
24,310	404,032	56,128	1,470,571	13,457	314,625	Frontenac.
17,549	293,419	47,771	1,327,918	7,242	177,646	Glengarry.
11,200	187,040	31,680	882,950	6,280	177,473	Grenville.
98,875	2,252,373	136,128	3,653,831	42,772	1,694,627	Grey.
23,070	472,243	37,821	1,057,858	12,217	395,098	Haldimand.
5,569	70,114	8,502	154,966	2,761	54,447	Haliburton.
20,267	477,085	31,992	979,853	9,750	419,933	Halton.
31,163	512,320	75,633	1,981,164	16,641	373,590	Hastings.
93,251	2,520,575	123,031	3,780,269	47,554	2,184,155	Huron.
53,144	1,189,894	76,898	2,135,778	25,147	974,446	Kent.
70,313	1,688,918	97,065	2,756,323	34,897	1,318,060	Lambton.
30,232	513,339	55,649	1,384,380	14,706	467,357	Lanark.
20,228	315,557	52,808	1,441,522	9,200	228,988	Leeds.
22,303	330,530	46,534	1,091,626	11,442	296,005	Lennox & Addington.
9,956	191,852	19,558	557,688	6,160	182,274	Lincoln.
7,397	119,092	10,570	232,622	3,664	105,340	Manitoulin.
96,012	2,630,729	145,822	4,718,764	50,436	2,154,122	Middlesex.
9,125	134,685	14,952	329,365	4,709	108,166	Muskoka.
3,869	58,228	7,197	182,263	1,903	45,044	Nipissing.
19,427	336,087	39,040	1,097,856	12,507	357,075	Norfolk.
27,777	511,652	54,167	1,463,275	14,438	424,477	Northumberland.
51,936	1,184,141	73,892	2,129,347	21,365	906,303	Ontario.
43,190	1,280,152	90,518	3,399,973	26,642	1,042,235	Oxford.
10,439	154,497	16,271	350,336	5,475	117,384	Parry Sound.
28,561	759,723	44,847	1,472,398	19,563	826,537	Peel.
64,878	1,416,287	100,740	2,892,008	29,274	1,139,930	Perth.
26,707	455,354	47,397	1,204,746	12,702	333,300	Peterborough.
16,355	217,358	39,998	941,307	5,919	139,925	Prescott.
10,762	227,832	27,223	876,231	5,753	138,302	Prince Edward.
3,427	71,110	5,426	148,711	1,170	31,543	Rainy River.
40,119	732,974	64,302	1,421,464	20,283	479,084	Renfrew.
15,253	228,337	32,685	767,857	7,066	160,681	Russell.
82,086	1,486,577	118,735	2,834,894	32,663	1,073,959	Simcoe.
9,639	157,790	32,804	963,005	5,117	113,956	Stormont.
4,293	77,274	6,600	162,956	2,653	62,080	Sudbury.
1,270	25,400	2,227	71,336	644	17,388	Thunder Bay.
41,159	797,661	59,112	1,451,689	18,876	564,015	Victoria.
27,012	553,746	43,713	1,254,019	17,122	734,534	Waterloo.
15,177	315,985	25,748	726,246	9,529	295,304	Welland.
65,025	1,539,792	91,905	2,795,088	35,414	1,602,484	Wellington.
19,312	413,663	34,459	1,033,630	11,898	396,798	Wentworth.
31,840	772,757	63,947	2,238,120	21,800	888,568	York.
						The Province:
1,593,088	34,169,476	2,668,584	75,247,197	800,228	28,513,187	1909.
1,711,485	36,171,681	2,824,859	77,255,267	798,062	27,733,956	1908.
1,774,165	37,515,768	2,926,236	79,485,780	*	*	1907.
1,834,571	39,668,875	2,963,618	80,303,276	741,476	27,205,105	1906.
1,782,519	37,953,623	2,889,503	76,764,482	714,007	25,871,468	1905.

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* Not taken in 1907.

SHEEP, SWINE

TABLE XX.—Showing by County Municipalities the numbers and values of Sheep, Swine and year ending June 30, 1909, together with the

Counties and Districts.	Sheep and Lambs.				Swine.	
	Number on hand.	Value.	Sold or slaughtered.		Number on hand.	Value.
			Number.	Value.		
Algoma	10,230	$45,524	3,846	$16,615	2,850	$22,287
Brant	11,028	69,256	7,538	40,931	26,856	181,009
Bruce	60,993	367,178	28,728	156,855	40,188	309,448
Carleton	21,023	109,950	9,450	48,290	28,032	222,854
Dufferin	29,093	152,738	12,373	61,989	24,027	175,397
Dundas	2,883	17,067	1,627	7,858	19,840	155,347
Durham	28,971	153,257	13,336	69,747	26,189	180,180
Elgin	31,242	185,577	14,024	78,254	61,048	404,138
Essex	25,007	125,535	9,791	46,214	117,255	785,609
Frontenac	19,784	98,920	9,749	47,770	18,748	149,609
Glengarry	7,469	42,872	2,689	13,499	16,864	139,634
Grenville	6,481	33,377	3,151	14,936	13,220	102,058
Grey	90,420	468,376	44,913	231,751	55,935	399,376
Haldimand	21,186	122,031	10,355	53,742	23,169	161,488
Haliburton	8,565	34,003	3,479	13,290	1,560	11,950
Halton	16,988	117,727	7,889	47,807	18,748	135,173
Hastings	41,608	180,995	18,269	71,797	37,720	313,076
Huron	42,379	248,341	21,992	120,296	54,590	408,333
Kent	21,990	120,945	8,340	42,951	113,416	725,862
Lambton	35,150	227,772	17,159	91,286	54,338	371,672
Lanark	28,962	138,438	12,472	59,741	18,077	129,974
Leeds	12,012	52,252	5,708	27,969	21,947	155,385
Lennox and Addington	13,478	80,464	8,452	40,908	15,897	125,268
Lincoln	11,816	72,550	5,750	33,005	13,035	97,763
Manitoulin	10,228	43,980	5,937	24,639	4,050	26,568
Middlesex	39,247	253,536	18,403	103,057	62,254	460,057
Muskoka	12,443	59,104	5,703	25,778	2,911	20,523
Nipissing	3,453	14,986	1,487	6,320	2,746	19,771
Norfolk	17,250	98,498	7,867	43,032	35,577	244,414
Northumberland	14,890	86,511	6,598	32,132	31,142	229,205
Ontario	41,691	267,656	18,876	105,328	47,340	351,263
Oxford	9,554	60,955	4,991	28,299	55,931	419,483
Parry Sound	16,312	75,035	7,154	31,478	3,952	28,494
Peel	15,402	93,952	9,205	52,100	23,051	177,262
Perth	21,168	125,738	9,375	50,906	57,477	421,306
Peterborough	18,480	88,334	7,332	33,947	24,347	165,316
Prescott	10,406	54,111	4,122	18,590	12,975	96,015
Prince Edward	7,980	36,628	3,221	14,495	12,346	95,064
Rainy River	1,984	12,797	589	3,787	1,646	15,637
Renfrew	51,115	222,350	21,758	91,384	19,587	139,068
Russell	7,825	44,290	2,347	11,876	12,439	98,392
Simcoe	65,212	344,319	25,358	130,594	74,330	518,823
Stormont	4,709	24,675	2,370	10,144	17,177	130,889
Sudbury	3,040	13,011	1,147	4,909	1,960	14,661
Thunder Bay	459	2,502	235	1,293	506	3,542
Victoria	31,747	162,545	15,412	77,522	27,586	194,757
Waterloo	11,273	70,005	6,202	37,894	40,893	308,742
Welland	16,136	95,848	7,611	42,393	12,718	100,472
Wellington	52,733	357,530	31,575	186,924	57,822	400,128
Wentworth	17,794	108,365	10,885	62,371	22,927	167,138
York	29,378	180,087	16,601	98,942	61,948	434,255
The Province:						
1909	1,130,667	6,262,493	533,441	2,767,635	1,551,187	11,144,135
1908	1,143,898	6,336,265	545,320	2,867,255	1,818,763	12,135,979
1907	1,106,083	5,928,325	*	*	2,049,666	14,174,502
1906	1,304,809	6,721,119	574,416	2,596,429	1,819,778	12,770,708
1905	1,324,153	6,191,774	603,736	2,584,209	1,906,460	12,280,667

*Not taken in 1907

AND POULTRY.

Poultry on hand on July 1, 1909, and the number and value of those sold or slaughtered in the totals for the Province for the past five years.

Swine.		Poultry of all classes.				Counties and Districts.
Sold or slaughtered.		Number on hand.	Value.	Sold or slaughtered.		
Number.	Value.			Number.	Value.	
3,146	$33,285	49,985	$20,494	20,976	$10,278	Algoma.
35,093	364,265	147,735	56,139	45,360	21,319	Brant.
61,640	667,561	410,902	147,925	119,404	58,508	Bruce.
32,060	342,721	313,708	131,757	136,123	66,700	Carleton.
31,580	348,643	162,412	60,092	51,245	23,573	Dufferin.
26,802	279,009	180,610	63,214	48,635	22,858	Dundas.
38,067	407,698	233,141	81,599	75,636	33,280	Durham.
67,452	743,321	358,057	118,159	125,080	56,286	Elgin.
119,557	1,295,998	531,633	180,755	212,944	89,436	Essex.
24,006	267,667	164,580	62,540	73,765	36,882	Frontenac.
20,389	219,997	149,224	56,705	52,969	22,777	Glengarry.
18,560	196,550	132,112	50,203	45,364	21,321	Grenville.
82,627	876,672	498,408	174,443	162,809	79,776	Grey.
29,542	317,281	191,892	72,919	71,518	32,898	Haldimand.
2,057	20,611	25,309	9,617	7,280	3,640	Haliburton.
26,488	291,898	139,057	57,013	66,713	34,691	Halton.
48,217	505,796	289,278	107,033	98,415	44,287	Hastings.
76,426	827,694	562,049	196,717	167,689	78,813	Huron.
116,230	1,305,263	603,215	199,061	178,693	78,625	Kent.
71,513	747,311	514,692	180,142	174,172	85,344	Lambton.
19 922	199,818	178,012	64,084	60,454	27,204	Lanark.
28,107	304,961	165,555	56,289	54,625	22,943	Leeds.
21,788	230,735	169,397	55,901	62,799	25,748	Lennox & Addington.
18,537	198,346	142,882	57,153	71,059	31,977	Lincoln.
4,376	39,253	33,736	10,796	13,135	5,517	Manitoulin.
78,983	837,220	741,766	274,453	222,839	111,420	Middlesex.
4,911	41,793	60,751	22,478	24,656	9,616	Muskoka.
3,058	33,669	44,106	18,525	19,812	9,312	Nipissing.
43,307	445,196	256,220	89,677	100,290	42,122	Norfolk.
44,687	483,066	294,490	106,016	75,024	36,762	Northumberland.
64,558	703,037	299,708	113,889	108,887	48,999	Ontario.
74,167	851,437	344,839	127,590	93,682	40,283	Oxford.
5,957	50,635	52,820	19,015	17,988	7,015	Parry Sound.
36,361	400,698	208,272	93,722	104,784	56,583	Peel.
85,575	937,046	415,985	149,755	117,310	53,963	Perth.
34,749	356,872	202,890	60,867	53,748	25,262	Peterborough.
11,794	141,764	128,017	47,366	48,255	23,162	Prescott.
17,540	199,605	122,937	43,028	38,570	15,428	Prince Edward.
2,230	27,318	28,852	11,252	9,636	4,722	Rainy River.
15,452	175,844	214,195	81,394	91,397	38,387	Renfrew.
13,307	142,651	107,061	42,824	40,855	18,793	Russell.
87,783	948,056	497,740	179,186	143,489	68,875	Simcoe.
22,968	248,054	138,340	49,802	42,938	18,034	Stormont.
1,773	20,496	23,667	10,413	11,747	5,756	Sudbury,
681	7,232	26,524	11,140	6,532	3,331	Thunder Bay.
36,392	373,382	226,380	74,705	86,249	39,675	Victoria.
59,904	631,987	204,778	67,577	62,040	27,298	Waterloo.
17,469	179,931	174,819	62,935	87,260	35,777	Welland .
84,029	920,958	362,192	134,011	121,771	59,668	Wellington.
34,735	387,295	186,307	80,112	87,730	44,742	Wentworth.
79,880	829,953	375,343	168,904	168,232	91,410	York.
						The Province :
1,986,432	21,407,549	12,086,580	4,411,386	4,177,583	1,951,076	1909,
2,129,944	21,600,459	12,285,613	4,439,854	4,108,750	1,895,753	1908,
*	*	13,428,076	4,854,381	*	*	1907.
2,222,758	22,501,028	10,254,824	3,697,338	3,473,708	1,374,246	1906.
2,267,583	22,202,233	9,738,493	3,335,660	3,340,802	1,300,253	1905.

*'Not taken in 1907

WOOL—BEES.

TABLE XXI. Showing by County Municipalities of Ontario the number, weight and value of fleeces of the wool clip in 1909, together with the totals of the Province for the past five years; also the number of colonies of bees and the value of apiaries.

Counties and Districts.	Clip of Wool.				Colonies of Bees.		
	No.	Pounds.	Lbs. per fleece.	Value.	No.	Value (including outfit).	Value per hive.
				$		$	$
Algoma	5,974	34,044	5.70	4,863	73	509	6.97
Brant	6,059	43,656	7.21	6,237	4,232	23,372	5.52
Bruce	32,643	216,202	6.62	30,886	4,768	34,377	7.21
Carleton	11,205	69,433	6.20	9,919	6,393	32,060	5.01
Dufferin	15,144	99,236	6.55	14,177	621	4,139	6.67
Dundas	1,937	10,329	5.33	1,476	1,858	10,253	5.52
Durham	16,528	128,388	7.77	18,341	3,720	18,106	4.86
Elgin	17,493	111,298	6.36	15,900	4,520	25,053	5.54
Essex	14,260	92,858	6.51	13,265	8,344	36,193	4.34
Frontenac	11,397	60,817	5.34	8,688	3,432	19,162	5.58
Glengarry	4,295	31,392	7.31	4,485	5,913	32,027	5.42
Grenville	3,830	19,516	5.09	2,788	4,672	25,200	5.39
Grey	51,015	336,447	6.60	48,064	6,747	43,247	6.41
Haldimand	11,795	75,906	6.44	10,844	6,070	38,350	6.32
Haliburton	5,320	27,862	5.23	3,980	500	2,975	5.95
Halton	9,814	67,906	6.92	9,701	1,477	8,267	5.60
Hastings	23,892	129,316	5.41	18,474	3,920	25,388	6.48
Huron	23,456	157,410	6.71	22,487	6,485	41,308	6.36
Kent	12,467	96,208	7.72	13,744	5,832	30,212	5.18
Lambton	19,563	133,472	6.82	19,067	8,537	41,325	4.84
Lanark	17,056	94,621	5.55	13,517	2,907	14,488	4.98
Leeds	6,717	36,641	5.45	5,234	3,038	16,650	5.48
Lennox & Addington	7,718	45,878	5.94	6,554	1,305	5,693	4.36
Lincoln	7,744	50,135	6.47	7.162	2,194	15,131	6.90
Manitoulin	5,752	39,908	6.94	5,701	577	4,799	8.32
Middlesex	21,475	157,851	7.35	22,550	11,726	66,145	5.64
Muskoka	7,316	40,445	5.53	5,778	95	844	8.88
Nipissing	1,664	9,654	5.80	1,379	72	460	6.39
Norfolk	9,801	61,839	6.31	8,834	5,536	29,871	5.40
Northumberland	9,439	69,962	7.41	9,995	4,458	23,608	5.30
Ontario	26,465	199,535	7.54	28,505	2,967	16,244	5.47
Oxford	5,291	38,371	7.25	5,482	3,710	24,770	6.67
Parry Sound	9,841	56,497	5.74	8,071	104	832	8.00
Peel	8,558	65,678	7.67	9,383	2,072	17,169	8.29
Perth	10,584	66,931	6.32	9,562	3,926	19,604	4.37
Peterborough	10,800	63,297	5.86	9,042	1,643	11,289	6.87
Prescott	6,316	41,092	6.51	5,870	6,171	34,074	5.52
Prince Edward	4,481	25,322	5.65	3,617	1,408	7,541	5.35
Rainy River	1,393	8,159	5.86	1,166	....	....	....
Renfrew	29,626	150,153	5.07	21,451	5,863	27,194	4.64
Russell	5,431	31,635	5.82	4,519	1,551	8,703	5.61
Simcoe	37,362	264,510	7.08	37,787	3,785	23,056	6.09
Stormont	1,935	14,226	7.35	2,032	3,202	20,653	6.45
Sudbury	1,560	8,920	5.71	1,274	60	300	5.00
Thunder Bay	209	1,402	6.71	200	....	....	....
Victoria	19,426	120,451	6.20	17,207	1,747	12,473	7.14
Waterloo	6,861	45,900	6.69	6,557	738	4,746	6.43
Welland	9,455	58,947	6.23	8,421	3,079	22,239	7.22
Wellington	29,375	223,671	7.61	31,953	2,845	19,835	6.97
Wentworth	9,397	63,993	6.81	9.142	2,443	18,562	7.60
York	17,028	121,155	7.12	17,308	2,702	17,626	6.52
The Province:							
1909	644,163	4,218,475	6.55	602,639	170,038	976,122	5.74
1908	635,448	4,150,510	6.53	581,071	179,688	1,028,599	5.72
1907	*	*	*	*	*	*	*
1906	684,808	4,543,981	6.64	727,037	196,387	1,112,236	5.66
1905	703,388	4,634,922	6.59	764,762	204,033	1,145,919	5.62

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*Not taken in 1907.

FARM PROPERTY, IMPLEMENTS AND LIVE STOCK.

TABLE XXII.—Showing by County Municipalities of Ontario the value of farm lands, buildings, implements and live stock for the year 1909, and the value of live stock sold or killed in the year ending June 30, 1909, together with the totals for the Province for the past five years.

Counties and Districts.	Land.	Buildings.	Implements.	Live Stock.	Total.	Value of Live Stock sold or killed.
	$	$	$	$	$	$
Algoma	2,619,538	913,101	354,230	697,269	4,584,138	131,206
Brant	9,070,739	4,603,913	1,191,787	2,419,797	17,286,236	810,667
Bruce	25,010,326	10,361,003	2,494,340	7,120,798	44,986,467	2,831,730
Carleton	20,021,297	7,440,787	2,128,384	4,979,623	34,570,091	1,290,331
Dufferin	11,380,610	4,988,097	1,161,737	3,051,555	20,581,999	1,166,023
Dundas	9,107,155	4,242,640	1,245,555	2,435,152	17,030,502	544,340
Durham	12,249,251	5,776,482	1,405,300	3,536,073	22,967,106	1,139,879
Elgin	18,618,350	8,059,288	2,123,057	5,209,289	34,009,984	1,998,040
Essex	19,760,178	8,014,910	2,438,819	4,914,627	35,128,534	2,213,276
Frontenac	9,564,425	4,701,770	1,420,192	3,078,052	18,764,439	800,399
Glengarry	9,139,975	4,213,352	1,237,202	2,576,353	17,166,882	563,794
Grenville	7,153,712	3,168,167	903,843	1,854,696	13,080,418	467,604
Grey	25,531,911	13,414,855	3,291,546	8,576,480	50,814,792	3,334,726
Haldimand	9,168,753	4,794,804	1,389,012	2,930,596	18,283,165	975,377
Haliburton	1,322,799	457,760	159,040	408,432	2,348,031	117,738
Halton	9,940,595	4,668,419	1,068,519	2,480,823	18,158,356	919,769
Hastings	16,815,688	6,854,135	2,006,617	4,606,180	30,282,620	1,201,280
Huron	29,352,941	13,089,360	2,985,873	9,049,456	54,477,630	3,889,576
Kent	26,845,040	10,841,682	3,317,002	6,467,121	47,470,845	2,721,790
Lambton	21,747,871	8,768,018	2,457,352	6,381,354	39,354,595	2,630,494
Lanark	10,821,752	4,036,943	1,180,052	3,137,416	19,176,163	896,416
Leeds	11,176,966	4,732,119	1,289,697	2,841,830	20,040,612	687,866
Lennox & Addington	10,110,441	4,687,215	1,258,569	2,491,039	18,547,264	728,546
Lincoln	10,313,726	4,196,283	1,126,456	1,882,914	17,519,379	542,562
Manitoulin	1,606,098	644,123	248,798	598,246	3,097,265	203,085
Middlesex	35,214,204	14,621,807	3,429,148	9,872,010	63,137,169	3,754,279
Muskoka	3,217,546	1,369,682	441,043	872,596	5,900,867	223,087
Nipissing	3,015,067	901,205	349,304	532,017	4,797,593	121,113
Norfolk	12,184,012	5,737,048	1,573,398	3,195,549	22,690,007	1,071,679
Northumberland	14,304,423	6,942,098	1,675,218	3,868,037	26,789,776	1,186,452
Ontario	18,910,774	8,188,510	1,938,232	5,539,115	34,576,631	2,113,252
Oxford	22,393,741	10,156,282	2,499,750	6,564,368	41,614,141	2,223,747
Parry Sound	2,679,374	1,189,280	449,233	929,456	5,247,343	246,904
Peel	12,915,290	6,232,500	1,410,185	3,684,806	24,242,781	1,598,838
Perth	23,118,218	10,734,436	2,447,552	6,822,087	43,122,293	2,528,282
Peterborough	11,788,656	4,318,690	1,147,998	2,920,543	20,175,887	891,731
Prescott	10,071,107	4,117,422	1,167,485	2,126,303	17,482 317	403,941
Prince Edward	7,694,162	4,091,281	1,166,253	2,052,008	15,003,704	502,146
Rainy River	1,943,434	466,474	158,532	409,725	2,978,165	104,974
Renfrew	14,266,145	4,969,374	1,736,095	3,553,652	24,525,266	972,817
Russell	7,919,584	2,808,978	876,463	1,736,596	13,341,621	417,349
Simcoe	29,335,252	12,727,300	3,578,048	8,428,006	54,068,606	2,634,644
Stormont	7,762,072	3,414,725	863,876	1,950,439	13,991,112	454,062
Sudbury	2,195,292	433,560	258,926	426,086	3,313,864	117,097
Thunder Bay	1,463,940	215,612	94,145	189,628	1,963,325	33,980
Victoria	13,394,468	5,033,691	1,329,122	3,565,904	23,323,185	1,320,205
Waterloo	13,491,369	6,682,479	1,583,664	3,418,143	25,175,655	1,634,993
Welland	9,405,087	4,955,476	1,160,344	2,126,797	17,647,704	653,905
Wellington	22,826,950	11,507,939	2,493,544	6,797,667	43,626,100	3,115,769
Wentworth	14,027,029	6,726,204	1,575,642	2,994,845	25,323,720	996,126
York	26,802,296	11,479,547	2,504,575	6,446,346	47,232,764	2,337,037
The Province:						
1909	680,789,629	297,690,826	77,790,754	184,747,900	1,241,019,109	64,464,923
1908	671,531,018	288,180,121	74,485,730	186,014,756	1,220,211,625	62,975,648
1907	674,505,427	284,672,238	72,910,875	189,484,132	1,221,572,672	*
1906	661,199,920	273,414,187	71,197,619	183,307,394	1,189,119,120	61,528,288
1905	649,201,364	264,384,514	68,629,546	172,483,760	1,154,699,184	59,378,046

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*Not taken in 1907.

FARM VALUES PER ACRE.

TABLE XXIII.—Showing by County Municipalities of Ontario, average values per acre of farm property in 1909, together with the average for the Province for the past five years.

Counties and Districts.	Farm values, average per acre occupied.					Values buildings, Implements, and live stock, per acre, cleared.
	Land.	Buildings.	Imple-ments.	Live Stock.	Total.	
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Algoma	8 53	2 98	1 15	2 27	14 93	46 05
Brant	42 01	21 32	5 52	11 21	80 06	46 07
Bruce	27 03	11 20	2 70	7 70	48 63	35 92
Carleton	35 51	13 19	3 78	8 83	61 31	41 90
Dufferin	31 93	14 00	3 26	8 56	57 75	35 39
Dundas	38 35	17 86	5 24	10 25	71 70	46 30
Durham	32 99	15 56	3 78	9 52	61 85	35 49
Elgin	42 76	18 51	4 87	11 96	78 10	44 19
Essex	46 17	18 73	5 70	11 48	82 08	46 85
Frontenac	13 62	6 70	2 02	4 38	26 72	32 27
Glengarry	31 86	14 69	4 31	8 98	59 84	40 60
Grenville	26 28	11 64	3 32	6 81	48 05	32 12
Grey	23 92	12 57	3 08	8 03	47 60	36 32
Haldimand	32 62	17 06	4 94	10 43	65 05	38 06
Haliburton	2 27	78	27	70	4 02	23 22
Halton	44 33	20 82	4 76	11 06	80 97	47 18
Hastings	15 69	6 40	1 87	4 30	28 26	30 99
Huron	36 72	16 37	3 73	11 32	68 14	38 52
Kent	47 42	19 15	5 86	11 43	83 86	44 59
Lambton	32 97	13 29	3 73	9 67	59 66	37 56
Lanark	16 12	6 01	1 76	4 67	28 56	25 57
Leeds	23 95	10 14	2 76	6 09	42 94	33 45
Lennox and Addington	22 80	10 58	2 84	5 62	41 84	31 77
Lincoln	54 02	21 98	5 90	9 86	91 76	44 49
Manitoulin	5 85	2 34	91	2 18	11 28	33 76
Middlesex	46 40	19 27	4 52	13 01	83 20	42 36
Muskoka	5 72	2 44	78	1 55	10 49	41 25
Nipissing	6 36	1 90	74	1 12	10 12	36 98
Norfolk	30 60	14 41	3 95	8 03	56 99	38 53
Northumberland	32 76	15 90	3 84	8 85	61 35	36 46
Ontario	37 48	16 23	3 84	10 98	68 53	42 51
Oxford	47 50	21 54	5 30	13 92	88 26	48 57
Parry Sound	4 31	1 91	72	1 49	8 43	31 11
Peel	44 54	21 49	4 86	12 71	83 60	43 09
Perth	44 60	20 71	4 72	13 16	83 19	45 02
Peterborough	20 57	7 54	2 00	5 10	35 21	33 15
Prescott	34 33	14 03	3 98	7 25	59 59	35 77
Prince Edward	32 90	17 50	4 99	8 77	64 16	39 97
Rainy River	5 59	1 34	46	1 18	8 57	39 19
Renfrew	13 71	4 77	1 67	3 41	23 56	29 60
Russell	31 54	11 19	3 49	6 92	53 14	42 27
Simcoe	29 82	12 94	3 64	8 56	54 96	37 65
Stormont	31 48	13 85	3 50	7 91	56 74	42 02
Sudbury	6 03	1 19	71	1 17	9 10	31 01
Thunder Bay	4 41	65	28	57	5 91	42 37
Victoria	22 33	8 39	2 22	5 94	38 88	34 96
Waterloo	43 98	21 78	5 16	11 14	82 06	46 39
Welland	41 30	21 76	5 10	9 34	77 50	44 42
Wellington	36 32	18 31	3 97	10 81	69 41	41 95
Wentworth	51 64	24 77	5 80	11 03	93 24	52 74
York	49 95	21 39	4 67	12 01	88 02	46 66
The Province:						
1909	27 59	12 06	3 15	7 49	50 29	39 29
1908	27 41	11 77	3 04	7 59	49 81	38 82
1907	27 65	11 67	2 99	7 77	50 08	38 75
1906	27 23	11 26	2 93	7 55	48 97	37 42
1905	26 84	10 92	2 84	7 14	47 74	36 28

PART II.—CHATTEL MORTGAGES.

Table showing by County Municipalities of Ontario the total number and amount of Chattel Mortgages on record and undischarged on December 31st, 1909, against (1) all occupations, (2) farmers; together with totals for the Provinces for the past five years.

Counties and Districts.	Chattel mortgages against all occupations.				Chattel mortgages against farmers.			
	To secure existing debt.		For future indorsation.		To secure existing debt.		For future indorsation.	
	No.	Amount,	No.	Amount.	No.	Amount.	No.	Amount.
		$		$		$		$
Algoma	179	†5,485,985	1	2,000	93	19,173	....	....
Brant	261	165,092	....	....	102	67,094	....	....
Bruce	387	184,783	....	....	253	84,611	....	....
Carleton	449	339,678	10	‡605,908	77	27,013	2	405
Dufferin	117	73,127	....	....	76	29,413	....	....
Elgin	414	200,488	....	....	184	60,580	....	....
Essex	441	296,613	2	400	224	76,719	2	400
Frontenac	379	151,564	....	....	290	71,512	....	....
Grey	604	270,708	....	....	382	122,772	....	....
Haldimand	138	66,905	....	....	85	39,565	....	....
Haliburton	75	23,794	....	....	68	8,465	....	....
Halton	85	68,164	....	....	31	20,316	....	....
Hastings	599	225,779	1	400	384	92,877	....	....
Huron	245	162,467	....	....	128	65,248	....	....
Kenora	78	§1,174,981	....	....	13	4,561	....	....
Kent	772	463,897	....	....	605	297,147	....	....
Lambton	488	859,924	....	....	267	77,902	....	....
Lanark	164	86,913	....	....	83	37,085	....	....
Leeds and Grenville	322	166,167	....	....	222	97,574	....	....
Lennox and Addington	201	93,889	4	1,798	123	62,012	1	200
Lincoln	161	141,886	1	400	56	20,789	....	....
Manitoulin	107	341,302	....	....	80	14,524	....	....
Middlesex	341	276,570	....	....	110	69,923	....	....
Muskoka	169	93,884	....	....	65	29,229	....	....
Nipissing	345	**3,091,413	3	75,000	124	24,802	....	....
Norfolk	290	171,233	....	....	200	117,209	....	....
Northumberland	405	217,444	....	....	255	114,864	....	....
Ontario	136	77,149	2	2,000	120	47,694	2	2,000
Oxford	212	135,185	....	....	96	49,977	....	....
Parry Sound	210	††512,292	....	....	97	15,691	....	....
Peel	64	45,327	....	....	42	25,706	....	....
Perth	172	232,332	....	....	83	68,475	....	....
Peterborough	228	214,305	....	....	125	77,497	....	....
Prescott and Russell	156	123,009	....	....	101	35,330	....	....
Prince Edward	150	96,229	1	1,200	101	43,703	....	....
Rainy River	12	14,601	8	4,289	2	247	4	1,069
Renfrew	245	143,818	....	....	182	91,385	....	....
Simcoe	600	677,836	....	....	398	146,106	....	....
Stormont, Dundas & Glengarry	261	154,626	19	¶308,995	163	84,834	10	3,233
Sudbury	183	*431,661	3	901	86	31,599	....	....
Thunder Bay	95	135,149	1	4,203	15	5,136	....	....
Victoria	151	75,230	....	....	107	29,047	....	....
Waterloo	183	359,642	1	108	35	18,914	....	....
Welland	272	211,384	5	‖184,500	88	20,401	....	....
Wellington	273	282,396	....	....	118	77,937	....	....
Wentworth	579	475,237	10	***606979	116	49,887	5	4,186
York	1,298	‖‖8,299,520	11	23,150	161	57,574	....	....
The Province;								
1909	13,696	27,591,578	83	1,822,231	6,816	2,730,119	29	12,394
1908	14,227	14,065,572	84	257,040	7,098	2,768,786	23	9,558
1907	13,166	22,294,218	109	1,172,480	6,438	2,442,589	31	13,015
1906	14,640	14,927,312	97	416,520	6,993	2,709,016	25	7,614
1905	16,355	17,218,030	96	1,154,328	7,403	2,758,046	29	10,344

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* Including one lumberman for $300,000.

† Including one lumberman for $300,000, and one Steel Co. for $5,000,000.

‡ Including two companies for $602,500. § Including one Pulp mill for $1.000,000.

** Including 8 Industries for $2,045,709, and 14 lumbermen for $733,117. †† Including 25 lumbermen for $412,136.

¶ Including one Street Railway for $300,000. ‖ Including one Manufacturer for $150,000.

*** Including one Oil Co. for $600,000.

‖‖ Including 36 Manufacturers for $6,646,901, and 186 Hotels for $862,164.

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